

**Science, Technology, and Research Support Services
(STARSS) Contract NNL07AA00C
(Task Orders)**

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Task Order Number: 1-001_mod1 CY 3

Task Order Title: Long-term, Upper Atmospheric Data Set Management, Processing and Analysis

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide data processing support for the Stratospheric Aerosol and Gas Experiment (SAGE) II/III, similar occultation sensors, i.e. Atmospheric Chemistry Experiment (ACE) – Fourier Transform Spectrometer (FTS), ACE – Solar Imager, ACE – Measurement of Aerosol Extinction in the Stratosphere and Troposphere Retrieved by Occultation (MAESTRO), and other instruments that shall contribute to the long-term, upper atmospheric data set, which includes but is not limited to ozone, aerosol, water vapor, and nitrogen dioxide. Data processing support shall include the development, implementation and testing of algorithms necessary to combine sensor data with spacecraft ephemeris data to produce scientific data products defined by the lead NASA scientist. The contractor shall develop production software to run on the Science Computing Facility with data product archival at the LaRC Atmospheric Science Data Center and the LaRC SAGE web-site. Specific task components are derived in concert with the lead NASA scientist to support meeting established science goals and include product definitions; software design, planning and development; configuration management; documentation; data processing operation; software integration; testing and maintenance; debugging; and quality assurance.

The contractor shall provide algorithm implementation support for the Ozone Mapping Profiler Suite - Limb Profiler (OMPS-LP), which is planned to be launched onboard the NPOESS Preparatory Project (NPP). Algorithm implementation support shall include the development and testing of algorithms necessary to combine sensor data with spacecraft ephemeris data to produce NASA-specified scientific data products. The testing phase shall emphasize:

- Testing different algorithms to retrieve ozone and aerosol profiles,
- Testing different forward models to efficiently model the radiance profiles,
- and involve data from other limb scattering missions, e.g. the Optical Spectrograph and Infrared Imagers Suite (OSIRIS), the SCanning Imaging Absorption SpectroMeter for Atmospheric CHartography (SCIAMACHY) and the SAGE III.

Additionally, this support shall include analysis of instrument test characterization data necessary for the practical use of the algorithms.

The contractor will provide additional analysis and programming capability to support the OMPS-LP development effort with resources to accomplish required actions within the launch schedule. The contractor shall provide scientific and measurement validation studies of the algorithms and data products with data from occultation instruments and other atmospheric measurement systems; perform multidisciplinary science support, computer programming, field operation, and data reduction/analysis; develop and improve algorithms to invert atmospheric species; provide data, graphics, and other inputs for documenting technical analyses and scientific studies; perform quick-turnaround for special multidisciplinary tasks, unanticipated technical problems, and system malfunctions; and provide overall software and hardware system administration support for the Science Computing Facility. The contractor shall maintain communications with LaRC scientists, EOSDIS, others within the science community are necessary to support this effort.

The contractor shall provide instrument operations support, if needed, which may include but is not limited to planning; calibration studies; integration and testing; developing, validating, and executing on-orbit instrument commands; error analysis; trending; documentation; trouble-shooting; and operations of an occultation instrument.

Performance standards include:

- Algorithm approaches are demonstrated and documented within agreed upon schedules (schedules designated in monthly reports when appropriate)
- Demonstrate that algorithms have been implemented properly within agreed upon schedules (schedules designated in monthly reports when appropriate)
- Designated operation algorithms, once developed, are maintained under proper configuration management procedures and can be reproduced (if lost) within an agreed timeframe (timeframe designated in monthly reports)

when appropriate)

- Analysis and interpretations of science data are documented and presented within agreed upon schedules (schedules designated in monthly reports when appropriate)
- Measurements are successfully processed and archived within agreed upon schedules (Product delivery schedules will be designated in monthly reports when appropriate)
- Websites/databases/archives are updated within an agreed to timeframe (timeframe designated in monthly reports when appropriate)
- Required documents delivered within agreed to schedules (schedules designated in monthly reports when appropriate)
- Agreed-to processing products are provided to defined user within an agreed to timeframe (products and timeframe designated in monthly reports when appropriate)

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

Meeting/conference support; Field activities

4.0 Schedule/Milestones/Period of Performance

4.1 Schedule: Standard and agreed to data products are available within agreed upon schedule of receiving input data required for processing (timeframe designated in monthly reports are appropriate).

4.2 Milestones: As established by the TM and agreed to by the contractor in monthly meetings.

4.3 Period of Performance: November 1, 2008 to October 31, 2009.

5.0 Deliverables/Reporting Requirements

- Upper atmospheric data products as specified by the TM or lead NASA scientist
- Science & production code developed to produce data products to be delivered within 3 months of data product acceptance by the TM. All supporting documentation for algorithms and code shall be delivered within 6 months following completion of code development phase. Interim documentation shall be provided as requested by the TM.
- Scientific publications and papers as appropriate to report results to the scientific community.
- The contractor shall report the status of ongoing tasks, results, and issues to the TM by the end of each month.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-002_mod0 CY 3

Task Order Title: CALIPSO Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

CALIPSO (Cloud-Aerosol Lidar and Infrared Pathfinder Observations) is a satellite mission designed to provide global measurements of aerosols and clouds required for a better understanding of their role in the climate system and to improve our abilities to predict long-term climate change and seasonal-interannual climate variability. The contractor shall provide support to the CALIPSO mission in five functional areas: Science analysis and Algorithm Development, Missions Operations, Data Management and Other Support Activities, This task also supports MIDAS (Multi-Instrument Data Analysis and Synthesis) in the functional area of science analysis. The contractor shall independently manage and track each functional area.

CALIPSO Science:

Science functions shall be responsive to requirements established by the Task Monitor (TM), the Project Scientist, and/or the Principal Investigator. The contractor shall provide science analysis and engineering support for the CALIPSO mission and support the validation of data products. Science and engineering analysis shall include algorithm development, implementation, and maintenance; characterization of CALIPSO's instrument performance; and investigations of aerosol and cloud properties and their effects on climate, weather and air quality using the CALIPSO data products and other data sets. The contractor shall also support scientific and measurement validation studies with data from other atmospheric measurement and modeling systems identified by the Project Scientist. The contractor shall provide maintenance, experiment operations, data reduction, and database archive support for CALIPSO aircraft and field correlative measurement activities.

The contractor shall provide data, graphics, and other inputs for documenting technical analyses and scientific studies. The contractor shall perform quick-turnaround requests (less than 2 weeks response time) for special multidisciplinary tasks, unanticipated technical problems, and system malfunctions. The contractor shall provide consulting, outreach, website, logistical and language (French) translation support for CALIPSO-related activities.

In the performance of these CALIPSO science analysis and engineering support tasks, the contractor shall ensure that the following core processes are effectively implemented: software development, quality assurance, configuration management and testing.

The contractor shall meet the following performance standards in providing CALIPSO science analysis and engineering support:

- Algorithm approaches are demonstrated and documented within schedules agreed upon between the contractor and the TM (or Project Scientist)
- Demonstrate that algorithms have been implemented properly within schedules agreed upon between the contractor and the TM (or Project Scientist)
- Analysis and interpretations of science data are documented and/or presented within schedules agreed upon between the contractor and the TM (or Project Scientist)
- Required documents and software delivered within schedules agreed upon between the contractor and the TM (or Project Scientist)
- Websites/databases/archives are updated within schedules agreed upon between the contractor and the TM
- Analysis and the display of science data are documented and available using software tools developed within schedules agreed upon between the contractor and the TM (or Project Scientist).
- Results of studies, investigations, and design activities are delivered within schedules agreed upon between the contractor and the TM or designated cognizant staff.

CALIPSO Mission Operations:

The contractor shall provide overall mission operations support for the CALIPSO mission. Mission Operations support shall be responsive to requirements established by the CALIPSO Mission Operations Manager, Project Scientist, and/or the Task Monitor. Mission operations support shall include payload instrument operations; mission planning; developing, validating, and executing on-orbit instrument commands, maintenance and enhancement of flight and ground processing software; documentation; trend analyses; trouble-shooting; and operation of the CALIPSO mission operations data processing system.

The contractor shall perform quick-turnaround requests (2 weeks or less response time) for special multidisciplinary tasks, unanticipated technical problems, and on-orbit and ground system malfunctions.

The contractor shall provide engineering support for the CALIPSO mission. Engineering support shall include system and component characterization and testing; data acquisition; algorithm development and maintenance of flight software qualification facilities.

The contractor shall provide programming support to extract engineering and scientific data from the science data downlink stream and perform analysis on engineering parameters, instrument performance, and science data.

The contractor shall provide the necessary communications devices to their staff in order to execute appropriate mission operation activities as determined by the TM (or Mission Operations Manager).

In the performance of these CALIPSO mission operations tasks, the contractor shall ensure that the following core processes are effectively implemented: systems engineering, systems development, software development, quality assurance, configuration management and testing.

The contractor shall provide consulting, website, logistical and language (French) translation support for CALIPSO-related mission operations activities.

The contractor shall meet the following performance standards in providing CALIPSO mission operations support:

- Payload command loads shall be fully validated and delivered per schedules agreed upon between the contractor and the TM (or Mission Operations Manager)
- Daily payload health, status, and limit monitoring checks performed according to schedules agreed upon between the contractor and the TM (or Mission Operations Manager)
- Required documents and software delivered within schedules agreed upon between the contractor and the TM (or Mission Operations Manager)
- Agreed to data products are provided to defined users within schedules agreed upon between the contractor and the TM (or Mission Operations Manager)
- All external datasets required for production processing (includes ephemeris, Level 0, met data, etc.) shall be captured and archived within schedules agreed upon between the contractor and the TM (or Mission Operations Manager).

CALIPSO Data Management:

The contractor shall provide overall data management support for the CALIPSO mission. Data Management support shall be responsive to requirements established by the CALIPSO Data Management Lead, the Project Scientist, and/or the Task Monitor. Data management support includes the development, implementation, testing and maintenance of algorithms necessary to combine CALIPSO instrument data with spacecraft ephemeris data to produce meaningful scientific data products. The contractor shall develop and maintain production software to run at the LaRC Atmospheric Science Data Center and conduct necessary data production operations to produce and archive CALIPSO data products in a timely manner.

The contractor shall perform quick-turnaround requests (less than 2 weeks response time) for special multidisciplinary tasks, unanticipated technical problems, and system malfunctions.

In the performance of these CALIPSO data management tasks, the contractor shall ensure that the following core processes are effectively implemented: systems engineering; systems development; and software development, quality assurance, configuration management, testing and code archival.

The contractor shall meet the following performance standards in providing CALIPSO data management support:

- Designated operational code that implements algorithms, once promoted to operational status, are maintained under proper configuration management procedures and can be reproduced (if lost) within a timeframe agreed upon between the contractor and the TM (or Project Scientist)
- Measurements are successfully captured and archived within schedules agreed upon between the contractor and the TM (or Project Scientist)
- Required documents and software are delivered within schedules agreed upon between the contractor and the TM (or Project Scientist)
- Agreed to CALIPSO production and ancillary data products are delivered to defined users within a timeframe agreed upon between the contractor and the TM (or Project Scientist) (includes nominal, expedited and reprocessing)
- CALIPSO standard, expedited, and reprocessed data products will be produced and delivered within schedules agreed upon between the contractor and the TM (or Project Scientist)
- All external data sets required for production processing (including ephemeris, Level 0, met data, etc.) shall be captured and archived within schedules agreed upon between the contractor and the TM (or Project Scientist).
- Transition of the CALIPSO data processing software system to a new cluster-based computer architecture including the porting of code and complete verification testing of the system within schedules agreed upon between the contractor and the TM (or the Project Scientist).

Other CALIPSO Support:

The contractor shall provide technical writing assistance in order to submit CALIPSO documentation through the NASA Scientific and Technical Information (STI) process for publication.

The contractor shall support CALIPSO Science Team Meeting travel for non-NASA participants as determined by the TM (or Project Scientist).

The contractor shall provide logistical and administrative support for planning CALIPSO meetings and/or workshops within schedules agreed upon between the contractor and the TM (or Project Scientist).

The contractor shall provide logistical and administrative support for visiting academic scientists and engineers that are collaborating on CALIPSO related research and data production activities. Support shall include providing temporary accommodations necessary to conduct normal business activities within schedules agreed upon between the contractor by the TM (or Project Scientist).

The contractor shall meet the following performance standards in providing miscellaneous CALIPSO support:

- CALIPSO documentation is submitted and published following NASA STI procedures and guidelines within schedules agreed upon between the contractor and the TM (or Project Scientist).
- Provide reimbursement for travel to the CALIPSO Science Team Meeting upon submission of an expense report.

MIDAS Science:

- Algorithm approaches are demonstrated and documented within schedules agreed upon between the contractor and the TM (or MIDAS Principal Investigator).
- Algorithms are demonstrated to have been implemented properly within schedules agreed upon between the contractor and the TM (or MIDAS Principal Investigator).
- Analysis and interpretation of science data are documented and/or presented within schedules agreed upon between the contractor and the TM (or MIDAS Principal Investigator).
- Required documents and software are delivered within schedules agreed upon between the contractor and the TM (or MIDAS Principal Investigator).
- Web sites/databases/archives are updated within schedules agreed upon between the contractor and the TM (or MIDAS Principal Investigator).

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

Mission Operations technical team members are required to monitor mission performance outside of normal business hours on a rotating on-call basis and to complete on-line checklists twice daily (morning and evening) seven days per week. In order to maintain after hours limit violation notification capabilities and contact our mission partner, Centre National d'Etudes Spatiales (CNES), outside of normal working hours, the contractor shall provide to their technical team members cell phones capable of receiving e-mail messages

4.0 Schedule/Milestones/Period of Performance

November 1, 2008 to October 31, 2009

Schedules will be agreed upon during biweekly team meetings nominally scheduled at 2 p.m. on the Wednesday, or as requested by the Task Monitor and/or the Project Scientist.

5.0 Deliverables/Reporting Requirements

CALIPSO Science:

The contractor shall provide Monthly Reports (electronic files) which include completed and projected accomplishments and metrics reflecting the contractor's success in meeting the CALIPSO Science performance standards described in Section 2. These reports shall be presented at the monthly team meetings.

The contractor shall provide CALIPSO code and supporting documentation as determined by discussion with the Task Monitor.

The contractor shall provide CALIPSO software tools and supporting documentation for the analysis and display of CALIPSO data as determined by discussion with the Task Monitor (or Project Scientist).

The contractor shall produce CALIPSO publications and presentations for CALIPSO Science Team and other technical meetings as determined by discussion with the Task Monitor and/or the Project Scientist.

The contractor shall provide oral or written status reports as determined by discussion with the Task Monitor.

CALIPSO Mission Operations:

The contractor shall provide Monthly Reports which include completed and projected accomplishments and metrics reflecting the contractor's success in meeting the CALIPSO Mission Operations performance standards described in Section 2. These reports shall be presented at the monthly team meetings.

The contractor shall provide CALIPSO standard and expedited data products as determined by discussion with the Task Monitor.

The contractor shall provide and maintain CALIPSO code and supporting documentation as determined by discussion with the Task Monitor.

The contractor shall produce CALIPSO publications and presentations for CALIPSO Science Team and other technical meetings as determined by discussion with the Task Monitor.

The contractor shall provide oral or written status reports as determined by discussion with the Task Monitor.

CALIPSO Data Management:

The contractor shall provide Monthly Reports which include completed and projected accomplishments and metrics reflecting the contractor's success in meeting the CALIPSO Data Management performance standards described in Section 2. These reports shall be presented at the monthly team meetings.

The contractor shall provide CALIPSO standard and expedited data products as determined by discussion with the Task Monitor.

The contractor shall provide and maintain CALIPSO code and supporting documentation as determined by discussion with the Task Monitor.

The contractor shall produce CALIPSO publications and presentations for CALIPSO Science Team and other technical meetings as determined by discussion with the Task Monitor.

The contractor shall provide oral or written status reports as determined by discussion with the Task Monitor.

MIDAS Science

The contractor shall provide Monthly Reports which include completed and projected accomplishments and metrics reflecting the contractor's success in meeting the MIDAS Science performance standards described in Section 2. These reports shall be presented at the monthly team meetings.

The contractor shall provide MIDAS code and supporting documentation as determined by discussion with the Task Monitor and/or the MIDAS Principal Investigator.

The contractor shall produce MIDAS publications and presentations for MIDAS Science Working Group and other technical meetings as determined by discussion with the Task Monitor and/or the MIDAS Principal Investigator.

The contractor shall provide oral or written status reports as determined by discussion with the Task Monitor and/or the MIDAS Principal Investigator.

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-005_mod3 CY 3

Task Order Title: Light Detection and Ranging (LIDAR)

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall develop software for conducting experiment simulations, analytical studies, and data reduction associated with atmospheric LIDAR remote sensing programs. The contractor shall develop hardware and software for data acquisition and real-time analysis systems for airborne LIDAR atmospheric investigations. The contractor shall develop, operate, and maintain lasers, detectors, and control systems in integrated airborne LIDAR systems. The contractor shall provide on-site operations, systems, networks, and configuration support to the LIDAR program. The contractor shall provide hardware support for lasers, detectors, and control systems for these LIDAR systems.

The contractor shall document the analysis and interpretations of science data in informal reports, papers, or journal articles. The contractor shall provide additional support for the ASCENDS mission. The contractor shall provide additional support for the airborne HSRL lidar systems.

Performance standards are as follows:

- Analysis and interpretations of science data are documented and/or presented within schedules agreed to between the Contractor and NASA Technical Monitor.
- Measurements are successfully captured and archived within schedules agreed to between the Contractor and NASA Technical Monitor.
- Laser and LIDAR system components and subsystems are successfully developed and operated within schedules agreed to between the Contractor and NASA Technical Monitor.
- Computer/Network functionality shall be restored within one shift of failure contingent upon availability of parts.
- Develop, integrate, and test lidar components and subsystems, including autonomous control and data acquisition systems, for the Uninhabited Aerial Vehicle (UAV)-based Global Ozone Lidar Demonstrator (GOLD) project.
- Generate backups as specified by each point of contact within schedules agreed to between the Contractor and NASA Technical Monitor.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

- Period of performance: November 1, 2008 to October 31, 2009
- Milestones and schedules are as agreed to in monthly planning and coordination meetings between the Contractor and NASA Technical Monitor.

5.0 Deliverables/Reporting Requirements

Contractor shall deliver following to NASA Technical Monitor at agreed upon intervals and in specified formats:

- LIDAR standard data products.
- LIDAR experiment simulation results.
- LIDAR, in situ, and satellite data analysis products.
- Resolution of all systems and configuration problems.
- Backup of all units on a prioritized schedule.
- Updates of system and standard products.
- Informal meetings as needed at the request of the customer.
- Contractor shall provide quarterly reports on progress, results, and issues electronically to NASA Technical Monitor
- Papers and journal articles as appropriate.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-006_mod0 CY 3

Task Order Title: Hyperspectral Remote Sensing Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide software and analysis support for hyperspectral remote sensing research. The contractor shall port the NPOESS (NPOESS is the National Polar-orbiting Operational Environmental Satellite System) Cross-track Infrared and Microwave Sensor Suite (CrIMSS) algorithm to a local computer and test the algorithm functionality. The contractor shall develop computer programs to implement data retrieval and analysis algorithms. The contractor shall run computer simulations using the data retrieval and analysis programs in support of the hyperspectral remote sensing group for algorithm development. The contractor shall support hyperspectral remote sensing data analysis and validation by comparing results with other data sets. The contractor shall develop radiative transfer model for hyperspectral sensors. The contractor shall develop variational retrieval/assimilation methods for hyperspectral sensors

Performance Standards:

- Algorithms are demonstrated to function as designed on a local computer system.
- Software is developed and tested on schedules agreed upon between the contractor and the Task Monitor (TM).
- Analyses to support algorithm development are completed within schedules agreed upon between the contractor and the TM.
- Data analysis and validation activities are accurate and completed within schedules agreed upon between the contractor and the TM.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance: November 1, 2008 to October 31, 2009

Schedules will be established in monthly meetings between the TM and the contractor held during the first week of each calendar month.

5.0 Deliverables/Reporting Requirements

- Monthly report in electronic format submitted to the TM detailing the work progress, significant results, issues, and plans. Report shall be submitted at the end of each calendar month.

- Software and related documentation shall be delivered via electronic media to the TM when completed.
- Analysis results, data sets, and plots shall be delivered to the TM per agreed upon schedule between the contractor and the TM.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-007_mod0 CY 3

Task Order Title: Validation and Mapping of SABER Data

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

Background: The Sounding of the Atmosphere using Broadband Emission Radiometry (SABER) experiment is a satellite instrument that begun taking data in January 2002 and is still continuing. The algorithms for retrieving its dataset are state-of-the-art and its products must be well characterized before they are used for scientific studies. Presently, the profiles of temperature, ozone and geopotential height in public Version 1.07 are of good quality. Improvements are still being made for the retrieval of carbon dioxide and water vapor. Thus, there is an on-going need to characterize and validate these products, as well as studies of the other retrieved quantities. There is also a need to generate daily, global-scale maps (or Level 3 products) of the distributions of the V1.07 profiles and to account for the effects of the tides and short-period planetary waves in them, particularly for the mesosphere and lower thermosphere (MLT) region.

The Contractor shall perform the following task requirements:

2.1 The Contractor shall conduct comparisons of both preliminary and operational SABER temperature, geopotential height and ozone with other high quality datasets for the purpose of the continuing assessment and validation of those SABER products. The Contractor shall also conduct comparisons for the improved retrievals of carbon dioxide, atomic oxygen, and water vapor. The Contractor shall provide the results of those comparisons to the Langley Task Monitor (TM) and to the SABER Science Team for evaluation and for the purpose of presentations in meetings and/or for reports and journal publications. The Contractor shall apply Sequential Estimation (SE) mapping routines to the SABER temperature, geopotential height, and ozone for the purpose of generating the distributions of those parameters for several selected yaw periods, particularly for the mesosphere. The Contractor shall calculate wind distributions for the mesosphere based on a gridding of those mapped geopotential height data and compare them with the wind fields from the GEOS-5 data assimilation. The Contractor shall participate as a co-author on any report and/or paper that describes the approaches and results of these activities.

2.2 Performance Standards:

Results of the data comparison studies are documented and presented within agreed upon schedules or, as needed, for quick evaluations of test runs from new retrieval algorithms.

Preliminary results from the data mapping activities are provided to the LaRC Task Monitor for verification of their quality within a few days of their creation. Results from the final runs will be evaluated jointly by the Contractor and the LaRC task monitor.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance: November 1, 2008 to October 31, 2009

5.0 Deliverables/Reporting Requirements

Deliverables:

Contractor shall deliver upon completion: (1) Plots of data comparison results for SABER T(p), Z(p), and O3(p), (2) Plots of data comparison results for CO2, O, and H2O, (3) Files of daily zonal Fourier coefficients and selected gridded plots from the SABER dataset using the SE routines, (4) gridded plots of SABER wind fields on pressure surfaces, and (5) a written description of the products from the SE mapping activities at the end of the performance period, plus a working copy of the routines used to generate them. The Fourier coefficient output will be provided to other researchers in a format that they can easily read.

Reporting:

Contract shall provide a quarterly report of task status and accomplishments electronically to the NASA Technical Monitor.

Contractor shall present information via Power Point presentations at 1 SABER Science Team Meeting (STM) per year at Hampton University. Material presented shall be coordinated before the meetings with the NASA Technical Monitor.

Informal oral reports shall be made by the contractor to the NASA Technical Monitor at the request of the NASA Technical Monitor as required.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-008_mod0 CY 3

Task Order Title: ACE/SciSAT-1, Aura, NDSC, and AMCA Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

Focus is to analyze solar absorption spectra and interpret those results with atmospheric models. The primary source of data is the solar occultation spectra recorded by the Atmospheric Chemistry Experiment (ACE which is received University of Waterloo, Ontario, Canada). Additional measurements may come from solar spectra recorded by the Fourier transform spectrometer located at the U.S. National Solar Observatory on Kitt Peak in southern Arizona.

The contractor shall perform the following four tasks:

Tasks “a” and “b” require capabilities in Fortran, C, idl, linux, and unix and use a common set of spectroscopic parameters. The goal of both efforts is to extend current capabilities, identify target scenes with a high probability of precise and useful quantitative analysis, and aid in the data analysis including calculations with back trajectories to help identify source emission regions. Earth system modeling mission support requires the application of currently existing models to aid in the interpretation of ACE observations. Modeling support (task “c”) requires support with an air quality model to simulate tropospheric ACE measurement scenes. Requirement for these four efforts are described individually below.

a). ACE data analysis. The contractor shall aid in the identification of spectral features, their quantitative analysis, and the comparison of ACE profile measurements with model calculations for near coincident measurements. Primary interest is the upper troposphere but measurements covering the lower thermosphere and mesosphere are considered. Tropospheric molecules of interest include formic acid (HCOOH), acetylene (C₂H₂), hydrogen cyanide (HCN), hydrogen peroxide (H₂O₂), peroxyacetyl nitrate (PAN), methyl cyanide (CH₃CN), nitric oxide (NO), HFC-142B, HFC-142B, and nitrogen dioxide (NO₂). The effort requires refinement of existing software and documented procedures for automated analysis of the ACE database for individual and/or co-added spectra. The contractor shall:

- Update algorithms for simulation and retrieval of vertical profiles from the ACE database consistent with line parameter updates at an agreed upon schedule.
- Generate plots of distributions of ACE time series or plots of correlations among ACE measurements as requested by the NASA Technical Monitor
- Provide maintenance of current graphics algorithms (e.g., ace_mplots for producing molecule-by-molecule plots of ACE simulations) at an agreed upon schedule.
- Refine procedures for batch analysis of database to search for absorption by spectral features at pre-selected spectral locations over pre-selected altitude ranges. The spectral locations will be selected by the NASA Technical Monitor.
- Analyze ACE database for spectral features over pre-selected altitude ranges to identify the presence of absorption by spectral features above statistically uncertainty. The altitude ranges will be selected by the NASA Technical Monitor.
- Work with files from modeling group assigned to task “c” to calculate, analyze, and compare model predictions and surface measurements of distributions with the ACE measurement time series.
- Document step-by-step procedures for the use of all algorithms for ACE data analysis in a user-accessible database including a list of machines supported for ACE data analysis.
- Update ACE measurement files as they are received from the group at the University of Waterloo, Ontario, Canada and maintain a runlog of the measurements.

b.) Aura and Network for the Detection of Atmospheric Composition Change (NDACC) measurement analysis. The contractor shall support ground-based solar spectra science analysis for the Network for the Detection of Atmospheric Composition Change and support Aura validation based on solar spectra recorded from the U.S. National Solar Observatory. The contractor shall:

- Generate a priori profiles and covariance matrix parameters based on datasets and for selected time periods as determined by the NASA Technical Monitor.
 - Perform atmospheric molecular column and mixing ratio time series retrievals with the SFIT2 and associated ray tracing algorithms and analyze output files to produce time series for atmospheric constituents and comparisons with other datasets as defined by the NASA Technical Monitor
 - Compute volume mixing ratio and column averaging kernels with the SFIT2 and ray-tracing algorithms
 - Maintain databases of ground-based solar spectra for use in atmospheric retrievals with SFIT2
 - Demonstrate that algorithms have been implemented and maintained within agreed upon schedules
 - Document in a user-accessible database the step-by-step procedures for the use of all algorithms for data analysis including a list of machines supported.
 - Provide Kitt Peak and other Network for the Detection of Atmospheric Composition Change (NDACC) measurements as requested to the Aura validation data center.
- c.) ACE Measurement-Model comparisons. Three groups with atmospheric air quality models have been identified as potential collaborators on ACE measurement model-studies. The groups are the Harvard group with GEOS-Chem, the University of Toronto group with their multi-scale air quality modeling system (GEM-AQ), and the Langley regional air quality modeling system (RAMQS). The contractor shall:
- Contact the groups and identify data formats and options for acquiring modeling data
 - After selection of best approach by the NASA Technical Monitor, download data from selected model for an analysis of ACE measurements with those from the selected regional air quality model

Performance standards are as follows:

- Algorithm approaches for tasks are demonstrated and documented within agreed upon schedules.
- Demonstrate that operational algorithms have been implemented properly within agreed upon schedules
- Designated that operational algorithms, once developed are maintained under proper configuration management

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

- Period of performance is November 1, 2008 to October 31, 2009
- Milestones and schedules are as indicated in the Description of Work (above) or as agreed to by the TM and the contractor.

5.0 Deliverables/Reporting Requirements

- Monthly summary progress reports shall be provided by the contractor for all defined tasks electronically via email to the Task Monitor.
- Informal weekly meetings will be held between the contractor and the NASA Technical Monitor at the request of the NASA Technical Monitor as required.

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-010_mod1 CY 3

Task Order Title: Airmass, Trajectory and Photochemical Modeling Studies

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall:

- Acquire and process data sets necessary for initializing and running airmass (Lagrangian Chemistry and Transport Model (LCTM)) or trajectory codes. Data sets include but are not limited to HALogen Occultation Experiment (HALOE), Atmospheric Chemistry Experiment (ACE-FTS), Polar Ozone and Aerosol Measurement (POAM II), and Stratospheric Aerosol and Gas Experiment (SAGE II/III).
- Construct or modify existing code to process acquired data into appropriate format for initialization and execution of LCTM or trajectory code.
- Modify LCTM or trajectory code to incorporate and utilize satellite data, as needed.
- Execute LCTM or trajectory software to support modeling for interpretation of data obtained from focused airborne field missions and satellite measurements.
- Acquire and process satellite, aircraft, or in-situ data sets such as from the NASA Aura satellite and the Polar Airborne Validation Experiment (PAVE) aircraft campaign, as needed, for comparison to model results.
- Analysis of satellite and aircraft data using model output.

Contractor shall provide increased level of support above the amount originally estimated for this task in order to accommodate an increase in data products.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

Maintain meteorological and satellite databases for scientific analysis

4.0 Schedule/Milestones/Period of Performance

Period of performance is November 1, 2008 to October 31, 2009

5.0 Deliverables/Reporting Requirements

The Contractor shall provide the following based upon a schedule provided by the NASA Technical Monitor:

5.1 Deliverables:

- Meteorological and satellite instrument datasets for initialization and execution of Lagrangian Chemistry and Trajectory model.
- Modified computer codes for reading datasets and initialization of trajectories.

- Satellite, aircraft, and balloon data for comparison to model results.
- Executed LCTM or trajectory model runs with output.
- Trajectory mapped satellite and in-situ measurements

5.2 Reporting requirements:

- The contractor shall provide a quarterly report of status and accomplishments electronically to the NASA Technical Monitor
- Informal verbal meetings will be held between the contractor and the NASA Technical Monitor at the request of the NASA Technical Monitor as required.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-011_mod0 CY 3

Task Order Title: In Situ Aerosol Measurements

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

- Required documents are received within time period requested by NASA Technical Monitor
- Data bases, web sites, and graphical products are created within time period requested by NASA Technical Monitor.

Description of Work

The contractor shall:

- Provide mission planning; instrument development, testing and checkout, and improvement; and execution of experiments to collect and analyze gaseous and particulate emissions from combustors and aircraft engines.
- Provide instrument set up and calibration, field operations, data acquisition, analysis and archiving for tropospheric chemistry field missions.
- Participate in making in situ measurements from aircraft as part of tropospheric chemistry field studies.
- Provide support in assimilating data from a variety of sources to create merged data sets and public-assessable data-bases for engine and combustor emission experiments.
- Provide support in creating and maintaining a web page.
- Provide computer graphics for presentations and journal publications.
- Provide calibration, pre-mission preparation, testing, and integration of the DACOM instrument.
- Provide assistance in generating reports and journal articles.
- Provide assistance in collecting and analyzing aerosol samples using a variety of laboratory equipment such as ion chromatography, thermal optical analysis, and GC/MS.
- Provide base measurement and data distribution support aboard the NASA P-3B.
- Incorporate and test newly available modifications to DACOM optical and flow systems.

Performance Standards

The contractor performance shall be evaluated on:

- Calibration, integration and deployment of instrument suites are accomplished by schedules agreed upon by the NASA Technical Monitor and contractor
- Measurements are captured and archived before agreed upon deadlines between the NASA Technical Monitor and contractor
- Analysis and interpretation of science data are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

Instrument engineer must have security clearance in order to participate in DOD sponsored laboratory and field studies.

All personnel must be able to travel to participate in domestic and foreign field experiments. Destinations and dates are to be determined.

4.0 Schedule/Milestones/Period of Performance

Period of performance is November 1, 2008 to October 31, 2009

5.0 Deliverables/Reporting Requirements

Contractor shall provide a written progress report of status and accomplishments on a semi-annual time basis electronically to the NASA Technical Monitor

Contractor shall deliver scanner system by the schedule agreed to by the NASA Technical Monitor and the contractor

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-012_mod3 CY 3

Task Order Title: Science Communication

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall research and write news releases, fact sheets, video scripts, photo captions and releases, and articles for media consumption that are related to activities and research in the Science Directorate. Topics shall be selected in discussions between the contractor and the Technical Monitor (TM). The contractor shall post TM-approved items on the Science Directorate NASA web portal page, and work with the NASA portal team to post selected items. The contractor shall research content, write text and oversee production of video news releases, video b-roll, photography, animation, graphic illustrations, and provide on-site consultation on technical content to support television remote live shots. The contractor shall work with LaRC Public Affairs Office to respond to news media inquiries concerning the Science Directorate, help arrange interviews with LaRC personnel and provide requested media products such as fact sheets, news releases, etc. The contractor shall develop and maintain NASA and non-NASA contacts to accomplish the above. The contractor shall provide feedback via email to appropriate LaRC personnel (e.g., program/project personnel, senior staff, etc.) on the daily record of news media outcomes as tracked by LaRC Public Affairs.

The contractor shall maintain an awareness of new media options and target SD content as appropriate for such new media outlets (blogs, MySpace, YouTube, etc, etc...)

The contractor shall provide additional technical writing support for internal Science Directorate communications including the annual report, metrics report, and weekly key activities.

The contractor shall provide technical writing assistance to Science Directorate personnel to maintain, update and upgrade web pages containing research and public outreach content, and ensure that the pages meet Agency criteria for security and design.

The contractor shall provide a staff member who can be part of a high-functioning communications team with specialized experience as a multimedia producer and graphic designer with animation experience. The contractor shall provide a junior level staff member with graphic designer experience to provide additional depth to existing support.

The contractor shall provide writing support for the Applied Sciences Program of NASA's Earth Science Division. This will include writing for the general public and for decision makers, in media including web, print, and new technologies such as podcasts. It will require interfacing with investigators carrying out Applied Sciences work around the country (via phone, email, or in person) to gather background information for writing.

Brand/Messaging Effort:

The contractor shall provide ongoing counsel and consultation support to ensure the effective and ongoing implementation of the Science Directorate's brand/messaging strategy and materials.

The contractor shall create fact sheet series for three projects to be agreed upon between the contractor and the Director for the Science Directorate (potentially ACE, ASCENDS and GEO-CAPE), to include: a) Development of “branded” fact sheet format with guidelines for consistent style/content approach; b) Design of pre-printed PDF template for printing fact sheets; c) Copywriting of content for three facts sheets referenced above.

The contractor shall provide a “TRIPWIRE” system for reporting opportunities, news, incidents which shall include the following: a) Determine any existing systems in place that capture information for NASA/Science Directorate events, opportunities, news and incidents; b) Provide thoughts and suggestions for a system and a plan to introduce the system to the Science Directorate staff so it will be used; c) Create PowerPoint presentation for staff that describes “tripwire” system for identifying and reporting potential leads; d) Receive Science Directorate feedback and make revisions as requested; e) Help organize a meeting (or email communications) to roll-out tripwire to Science Directorate staff; f) Rollout – meeting or other communication.

The contractor shall coordinate “Meet the Scientists” event and bring in students and civic leaders to discuss key events that shall include the following: a). Work with Science Directorate staff to identify several scientists who are willing to participate in “Meet the Scientist” event; b) Approach scientists and begin working with them to target a specific school-age group or a civic organization to reach out to; c) Help schedule event with school/organization; d) Work out logistics of “Meet the Scientist” visit; e) Create a list of possible topics for the essay contest and create guidelines for distribution to participating classrooms; f) Prepare pitch materials for pre-event promotion to local community and media; g) Host “Meet the Scientist” event; announcement of essay contest at the event.

The contractor shall solicit from workforce and promote the Science Directorate's “Community of People” and post to website and induce in newsletter. This activity shall consist of the following: a) Outline process involved in making “Community of People” happen, including creation of a list of criteria to choose right individuals; b) Create a list of questions to ask when interviewing individuals to ensure consistent profile; c) Work with Science Directorate to create the profile of the first individual for inclusion in newsletter; d) Provide thoughts and suggestions on where to post the story on the website and other possible Science Directorate and Langley Research Center venues.

The contractor shall continue participation in local events (EARTHFEST, Science Cafe, etc.) which shall consist of the following: a) Work with Science Directorate staff and Langley Research Center staff to identify local events where Science Directorate or Langley Research Center has a presence; b) Do research and provide thoughts and suggestions on how to use these events to reach out to the local community and invite participation and suggestions on how to promote the podcasts of these events. The contractor shall provide additional consulting support to include new Science Directorate missions in the branding/messaging strategy.

Performance Standards:

- Written products are completed within the agreed upon schedule with the TM.
- Responses to inquiries are handled within the agreed upon schedule with the TM.
- Websites are updated and maintained within a timeframe agreed upon with the TM.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 to October 31, 2009

Schedules and priorities shall be agreed upon between the Contractor and the Task Monitor in weekly status meetings.

5.0 Deliverables/Reporting Requirements

- Deliverables include news releases, fact sheets, articles, tip sheets for conferences with major LaRC participation, compliant web pages, and the Science Directorate annual report and shall be delivered in an agreed upon timeframe with the TM electronically or other media as appropriate.
- Deliverables for the branding/messaging initiative shall be completed based upon the schedule agreed to between the contractor and the Science Directorate in the media that is appropriate for the individual task.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-013_mod0 CY 3

Task Order Title: Analysis of Tropospheric Ozone Data

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall analyze satellite and meteorological data sets to investigate the distribution and origin of tropospheric ozone. The methodology to be employed is the tropospheric ozone residual (TOR) technique and improvements to this technique may be available from the continued analysis of data from the Ozone Monitoring Instrument (OMI) and other instruments including (but not limited to) Solar Backscattered Ultraviolet (SBUV) and the Tropospheric Emissions Spectrometer (TES). The analysis shall focus on the development of regional scale products, primarily using OMI measurements. The contractor shall continue and merge the existing TOR satellite database derived from the Total Ozone Mapping Spectrometer (TOMS) with the new measurements available from OMI. Global TOR distributions will be developed and archived into electronic database that has been constructed.

Products for validation of TOR shall also be analyzed. These products may consist of ozonesonde profiles, surface measurements, in situ aircraft measurements as well as assimilated data fields that have been derived from various photochemical/transport models. An additional component of this task is support the study quantifying the relationship between ozone data from both satellite and surface measurements and how ozone impacts soybean crop yield. The analysts shall develop the datasets necessary to perform the analysis and shall participate in the analysis of the data and subsequent documentation of the results.

Performance standards are as follows:

- Algorithm approaches are demonstrated and documented within schedules agreed upon between the contractor and the Technical Monitor (TM)
- Analysis data products delivered within schedules agreed upon between the contractor and the TM (schedules designated in monthly reports when appropriate)
- Validation data sets compiled and documented within schedules agreed upon between the contractor and TM.
- Websites/databases/archives are updated within an agreed to timeframe (schedules provided in monthly reports as needed)
- Data sets are processed and interim products are created within an agreed timeframe.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of performance is Award through 10/31/2009.

The contractor shall deliver a final report in electronic format on this study by January 30, 2009.

5.0 Deliverables/Reporting Requirements

The contractor shall deliver a final report in electronic format on this study by January 30, 2009.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-014_mod1 CY 3

Task Order Title: CERES Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall perform tasks to support the Clouds and the Earth's Radiant Energy System (CERES) project in five technical/scientific functional areas: 1) Instrument, ERBE-Like (ERBE is the Earth Radiation Budget Experiment) products, and operations; 2) Clouds; 3) Surface and Atmospheric Radiation Budget (SARB); 4) Angular Distribution Models (ADMs and top-of-atmosphere (TOA) fluxes; and 5) Time Interpolation and Spatial Averaging (TISA). In addition, the contractor shall perform tasks associated with Data Management (DM) support.

2.1 Technical/Science Support. The contractor shall perform analyses to establish accurate calibrations for all CERES instruments. The contractor shall monitor on-orbit instrument operations and provide support for identifying and implementing any required actions including actions associated with spacecraft maneuvers. The contractor shall perform cost, programmatic, and engineering trade analyses utilizing historical CERES and ERBE project data to facilitate development, acquisition and deployment of Earth Radiation Budget instruments/missions. The contractor shall perform tasks associated with development and implementation of the CERES cloud retrieval subsystem; development of angular distribution models and TOA flux subsystem; development of the SARB subsystem including surface-only algorithms; development of TISA algorithms and subsystems; and continued analysis of ERBE data. The contractor shall perform analyses to develop and validate surface ultraviolet radiation and surface photosynthetically active radiation (PAR) products; incorporate PAR into bio-geo-chemical models; investigate fusion of measurements from different instruments to study cloud 3-D effects; and determine the atmospheric response to rapidly changing sea ice cover in polar regions. The contractor shall study the performance of radiometric instruments in low-temperature and low-pressure environments for potential applications in polar regions and on high altitude platforms. The contractor shall develop and apply radiative transfer models to study cloud radiative effects at the top of the atmosphere and the surface. The contractor shall investigate aerosol and cloud interactions using satellite and surface observations. The contractor shall perform tasks associated with algorithm development, computer programming, analysis, validation, and internet-based data display and data dissemination for scientific studies related to the CERES project. The contractor shall perform radiative transfer studies, parametric analyses of radiation processes, cloud algorithm development, verification, and validation, related atmospheric studies, and visualization of results. The contractor shall summarize work/analyses in memos, reports, peer-reviewed scientific journals, or other appropriate avenues. Additional services may be required to support targeted CERES cloud and ice studies – in particular, liaison with CNES to facilitate science data interaction with institutions in France. The contractor shall provide asset management, software maintenance and license renewal tracking.

2.2 Data Management Support. The contractor shall provide the following Clouds and the Earth's Radiant Energy System (CERES) and Earth Radiation Budget Experiment (ERBE) Data Management (DM) support:

Provide coordination of contractor data management effort. Provide science data processing codes for implementing ERBE and CERES algorithms into Data Management Systems. The operational code must execute correctly at both the Science Computing Facilities and the Langley Tropical Rainfall Measuring Mission (TRMM) Information System (LaTIS) at the Atmospheric Science Data Center (ASDC). The contractor shall provide support for software design, development, implementation, testing, validation, configuration management, and documentation for processing and analyzing CERES and ERBE data from satellite missions. Provide validation processing for data products at the Science Computing Facilities as required. Documentation may include data products catalogs, interface requirements, data management plans, ancillary input data, quality assessment plans, coding guidelines, software design documents, validation documents, test plans, operator's manuals, data set collection guides, and other

documentation as needed to satisfy project/program requirements. The contractor shall support CERES DM activities as indicated in the subsections below.

2.2.1 Code Development

Consistent with requirements and priorities established by the CERES Subsystem Working Group Chairpersons, the contractor shall perform code development and maintenance for production and analysis codes. The contractor shall support code delivery of production codes to the ASDC for data product production in accordance with the CERES Code Delivery Process. The contractor shall develop and support on-production codes, consistent with the CERES Data Management and Configuration Management Plans, and consistent with requirements established by the Chairpersons. The contractor shall support code and algorithm reviews and evaluations as required by the CERES Data Management Team Lead or CERES Principal Investigator.

2.2.2 Develop and maintain documentation for the CERES Subsystem Codes.

In response to the technical requirements of the CERES Working Group Chairpersons, the contractor shall document the various codes and their development activities. The contractor shall publish any formal documentation through the configuration control processes. The contractor shall maintain working documentation to supplement coding, as required to make implementation understandable to reviewers.

2.2.3 Participate in subsystem working group and CERES Science Team meetings.

The contractor task participants shall attend local (within 25 miles of Langley) meetings (without travel reimbursement) as needed for the work requirements established by the Subsystem Working Group Chairpersons. Attendance at non-local meetings will be through the specific written authorization of either the Task Monitor or the Working Group Chair.

2.2.4 Perform Configuration Management processes for the CERES Production Codes and provide configuration management of non-production codes, as appropriate.

As specified in the CERES Configuration Management Plan and the CERES Data Management Plan, the contractor shall follow the requirements contained therein. The contractor shall proactively identify and recommend to the CERES Data Management Team Lead, such improvements to the processes and practices that will permit the delivery process to be more efficient (i.e., use less computer or personnel resources) and quicker in turnaround time without risking integrity and producibility of the codes delivered to the ASDC.

2.2.5 Define requirements for and monitor data stored in the CERES Science Computing Facility (SCF).

The efficient use of assigned storage capacity is important due to the volumes of data used and created in the SCF. Each working group is allocated dedicated space for their use. The contractor shall work with the CERES SCF Storage Tsar, to store CERES data products, both public and non-public, in a single location to avoid duplication of files; working groups shall identify their needs to the Storage Tsar, who will accommodate them within the space available.

2.2.6 The contractor shall maintain the Satellite Tool Kit (STK) and cereslib software in order to support CERES and CALIPSO code development. Changes to the Production version of the Toolkit shall be propagated after coordination with any other groups using it and approval by the CERES Data Management Team Lead.

2.3 Performance Standards

2.3.1 Performance Standards for Technical and Scientific support are as follows:

- Instrument on-orbit operations are successfully monitored and actions implemented to maintain instrument health and data gathering capability
- Instrument calibrations are to the required CERES accuracy standards
- Algorithm approaches are demonstrated and documented within agreed upon schedules
- Demonstrate that algorithms have been implemented properly within agreed upon schedules (schedules designated in monthly reports when appropriate)
- Designated operational algorithms, once developed, are maintained under proper configuration management procedures and can be reproduced (if lost) within an agreed to timeframe (timeframe designated in monthly reports when appropriate)
- Analysis and interpretations of science data are documented and/or presented within agreed upon schedules (schedules provided in monthly reports as needed)
- Websites/databases/archives are updated within an agreed to timeframe (schedules provided in monthly reports as needed)

2.3.2 Performance Standards for Data Management activities are as follows:

- Demonstrate that algorithms have been implemented properly within agreed upon schedules (schedules designated in monthly reports when appropriate)
- Designated operational algorithms, once developed, are maintained under proper configuration management procedures and can be reproduced (if lost) within an agreed to timeframe (timeframe designated in monthly reports when appropriate)
- Websites/databases/archives are updated within an agreed to timeframe (schedules provided in monthly reports as needed)
- Required documents delivered within agreed to schedules (schedules designated in monthly reports when appropriate)
- Representation by each subsystem data management team at the Bi-weekly CERES DMT meeting

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

3.2.1 Interaction with CERES Working Group Teams

Members of the CERES Data Management Team (DMT) support the CERES Instrument Working Groups and provide data management support in response to work requirements defined by these groups on an ongoing basis, while reporting activities to the DMT Lead.

3.2.3 CERES Storage Tsar

The Storage Tsar is responsible for allocating disk storage as appropriate, based on the CERES PI's priorities and the availability of disk space. The Tsar is responsible for projecting ahead the need for storage capacity and acquiring it as funding permits. The contractor shall provide recommendations as to future needs and requests for storage for working groups and teams and shall follow the allocations provided.

4.0 Schedule/Milestones/Period of Performance

November 1, 2008 to October 31, 2009

Data Management Team Biweekly Meetings: 10am on alternating Wednesdays.

5.0 Deliverables/Reporting Requirements

5.1 Technical/Scientific

Mission/instrument status reports provided to the instrument working group lead by the end of each month.

Monthly calibration status reports provided to the instrument working group lead by the end of each month.

Standard CERES data products for each subsystem as defined in on-line CERES documentation

Data retrieval and analysis algorithms as established by working group leads and the TM

Code and supporting documentation as established by working group leads.

Publications and presentations as appropriate to report results.

As appropriate, the above items shall be delivered electronically via email to the TM or designated representative.

5.2 Data Management

Informal Monthly Status Report via e-mail within 5 days of the end of the month

Code and Supporting Documentation as requested by the TM.

Publications/conference papers as appropriate.

Participation in CERES Bi-weekly DMT Meetings

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-017_mod2 CY 3

Task Order Title: CERES Ocean Validation Experiment (COVE)
Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall perform instrument installation, maintenance, data collection, instrument calibration, and systems upgrades associated with the CERES Chesapeake Lighthouse site. As part of this support the contractor shall provide, maintain, and operate a facility for COVE instrument characterization. The contractor shall arrange for helicopter transportation to the Chesapeake Lighthouse to conduct on-site operations and maintenance. This is expected to require about 30 trips to the COVE lighthouse site each year. The contractor shall also arrange for other modes of transportation, such as by boat, as required to complete the work. The contractor shall report work/analyses in memos, reports, peer-reviewed scientific journals or other appropriate avenues.

Resolve data quality issues, update WMO/BSRN archive database in Germany and include newly qualified data into the COVE database for public access.

Incorporate algorithms and store results in the COVE database to allow detailed scientific analyses based on cloudiness scenarios and different temporal sampling summaries. Implement access on the COVE website.

Install sunphotometer instruments at the Mauna Loa Observatory for optical depth calibration purposes, assure high quality observations for calibration purposes.

Performance standards are as follows:

- Measurements are successfully captured and archived within agreed upon schedules (schedules provided in quarterly reports as needed)
- Instrument calibrations are maintained as needed for accurate measurements.
- Analysis and interpretations of science data are documented and/or presented within agreed upon schedules (schedules provided in quarterly reports as needed)
- Websites/databases/archives are updated within an agreed to timeframe (schedules provided in quarterly reports as needed)
- Contractor operations are conducted in accordance with applicable NASA safety rules and regulations and with provisions of an approved Health and Safety Plan developed by the Contractor.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

November 1, 2008 to October 31, 2009

5.0 Deliverables/Reporting Requirements

The primary deliverables are data sets derived from COVE instruments. Other deliverables include reports, papers, and publications related to COVE including COVE reports at all CERES science team meetings. Schedules are as-agreed between the contractor and the TM. An oral or written quarterly report on the status of on-going activities, proposed schedules, and future plans shall be delivered to the Technical Monitor with the first report due at the end of January 2008.

Deliver a functional COVE database system "snapshot" for development on offsite location.

Deliver database elements for incorporation into the primary COVE database.

Provide onsite support for MLO calibration process of optical depth instrumentation.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-018_mod1 CY 3

Task Order Title: Surface Radiation Budget and Energy Management Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide scientific and technical support in two primary functional areas: 1) Surface Radiation Budget (SRB) Studies; and 2) Energy Management and Related Applications of SRB and Meteorological Datasets. Monthly meetings shall be held between the contractor and NASA Technical Monitor to discuss task schedules and status.

For SRB studies, the contractor shall validate, improve, analyze, and disseminate SRB algorithms and data products using surface, aircraft, and independent satellite based estimates. These functions are required to be in concert with goals and objectives of the NASA/Global Energy and Water Cycle Experiment (GEWEX) SRB project or other surface radiation data producing projects, such as the Fast Longwave and Shortwave Radiative Fluxes from CERES and MODIS (FLASHFLUX). The contractor shall respond to requests for data and documentation for users of the research data products; compare SRB data sets to other surface radiation data sets; analyze long-term time series of SRB data in conjunction with surface measurement records; analyze SRB measurements in context of other scientific investigations such as in relation to climate processes such as fire meteorology in Siberia; prepare data sets and perform analyses for the GEWEX - Radiative Flux Assessment (GEWEX-RFA) project; and summarize work/analyses in memos, reports, peer-reviewed scientific journals, or other appropriate avenues.

In the area of Energy Management and Applications, the contractor shall develop, validate, and disseminate data sets for decision support system needs in government and industry applications in the fields requiring parameters derivable from available Surface Radiation and meteorological products from scientific projects such as the GEWEX Surface Radiation Budget (SRB), Fast Longwave and Shortwave Fluxes from CERES/MODIS (FLASHFlux), and Clouds and the Earth's Radiant Energy System (CERES). This work is to be completed in concert with the goals and objectives of an International Energy Agency task and other projects as funded directly and through successful proposals to the NASA Earth Science Applied Science program. Applications in the fields of renewable energy, energy production and usage, human health, agriculture, water availability, and energy-efficient building design and management are emphasized but could be expanded with opportunities. Dissemination of data sets by the contractor shall be in the form of direct provision to users and the development and release of data through web based tools. The contractor shall respond to requests for documentation and information concerning to these products and shall interact with data users, and application organizations to better define required data products. Under POWER, the contractor shall develop capability to make and assess predictions of energy related quantities from atmospheric forecast models using satellite based and meteorological analysis data. The contractor shall summarize work/analysis in memos, reports, peer-reviewed scientific journals, or other appropriate avenues.

The contractor shall be required to address the following specific areas as it relates to the POWER project: 1) evaluating potential methods to enhance resolution of Surface Meteorology and Solar Energy web portal data products, 2) contribute to the potential development of improved solar irradiance retrievals using higher resolution inputs and parameterizations for direct/diffuse component estimates, and 3) complete the evaluation of available NASA modeling outputs for Solar forecasting products. Other tasks such as supporting the development of new decision tools through streamlining data products, such as the RETScreen Building Monitoring and Targeting tools, are to be completed according to needs and funding resources. Reports for each activity shall be submitted by the contractor to the NASA Technical Monitor. It is also anticipated that some of these results shall be submitted as conference and/or journal articles. These reports shall be in a format and time frame agreed upon by the contractor and NASA Technical Monitor.

Performance standards are as follows:

- Algorithm approaches are demonstrated and documented within agreed upon schedules
- Demonstrate that algorithms have been implemented properly within agreed upon schedules (schedules designated in reports when appropriate)
- Designated operational algorithms, once developed, are maintained under proper configuration management procedures and can be reproduced (if lost) within an agreed to timeframe (timeframe designated in reports when appropriate)
- Validation and documentation of data sets are provided on agreed upon schedules.
- Analysis and interpretations of science/application data are documented and/or presented within agreed upon schedules
- Measurements are successfully captured and archived within agreed upon schedules (schedules provided in monthly reports as needed)
- Websites/databases/archives are updated within an agreed to timeframe (schedules provided in reports as needed)
- Required documentation/reports delivered within agreed upon schedules.
- Presentations and/or journal articles submitted as a result of these activities as recommended by the NASA Technical Monitor.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 to October 31, 2009

Task schedules shall be as determined with the TM in regular meetings, teleconference and/or e-mail communications.

5.0 Deliverables/Reporting Requirements

Contractor shall provide to the NASA Technical Monitor electronically and as agreed upon with the TM:

- Quarterly highlight and plan reports
- Standard data products (e.g., data sets, documentation, etc.)
- Code and supporting documentation
- Web page documentation
- Publications and presentations
- The contractor shall attend meetings as requested
- The contractor shall deliver activity reports on agreed upon schedules

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-019_mod1 CY 3

Task Order Title: Analysis and Interpretation of Advanced Mission Concepts

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall perform analyses to support the development and analysis of advanced measurements for the study of tropospheric chemistry.

The contractor shall perform comparisons of sensitivity and precision of existing and planned tropospheric measurements (e.g., Measurement of Pollution in the Troposphere (MOPITT), Tropospheric Emission Spectrometer (TES), Ozone Monitoring Instrument (OMI), Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO), Geostationary Observatory for Tropospheric Air Chemistry (GeoTRACE)) and provide the Technical Monitor (TM) with data needed for quantifying requirements for future measurement systems. The contractor shall evaluate emerging science and engineering requirements and develop comparisons to present state-of-the-art space instrument capabilities.

The contractor shall develop software to ingest detailed model fields as “truth data” and perform measurement feasibility analyses using these data. The contractor shall provide documentation of methods, analysis results, and graphics to facilitate publishing results of these studies.

In addition to these advanced chemical composition measurement concepts, aerosols play an increasingly important role in the chemistry of the atmosphere. The contractor shall evaluate existing and planned tropospheric aerosol measurements (e.g., Moderate Resolution Imaging Spectroradiometer (MODIS), and Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO)), and advanced algorithm concepts for improved spatial and temporal resolution, and provide the Technical Monitor (TM) with data needed for quantifying requirements for future measurement systems.

The IRCRg project will characterize the performance of a 2.3 μm infrared correlation radiometer (IRCR) prototype subsystem intended specifically to measure carbon monoxide from geostationary orbit. The Earth Science and Applications Decadal Survey (2007) outlines 15 Earth observing missions to be conducted by NASA through 2020. The Decadal Survey mission GEO-CAPE requires infrared correlation radiometry to measure carbon monoxide in two spectral regions.

The contractor shall perform systems engineering for the IRCRg instrument incubator being developed by Applied Physics Laboratory (APL). This shall involve requirements development, document review, design review preparation, and trade study management.

Performance Standards:

The Contractor shall be evaluated on

- Analysis and interpretation of data are documented within established time frames agreed upon between the NASA Technical Monitor and contractor.
- Data products are delivered within time period requested by NASA Technical Monitor.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 to October 31, 2009

The ICRG project milestones listed below shall be coordinated closely with the task monitor. NASA Langley Research Center leads the instrument development.

1. June 2009 - Deliver a review package for the ESTO mid-term review.
2. September 2009 - Participate in Conceptual Design Review

5.0 Deliverables/Reporting Requirements

The contractor shall provide results of concept studies in written and graphical forms, where the focus is on conveying the technical findings clearly and concisely. These completion reports shall be submitted via email to the TM within 1 week after the completion of the study. It is expected that concept studies shall generally take 2-6 months, and no report is required until a study is complete. Some studies may take longer or require more thorough documentation as coordinated between the contractor and the TM. Standard project management reports (time-phased workforce and expenditures) shall be provided.

ICRG Project

The contractor shall provide informal electronic status reports (monthly) to the Task Monitor (TM) to summarize the work completed over the prior month. This report shall also contain a schedule update and work plan update for the following month, or more. As a technical consultant to NASA, the contractor shall provide recommendations and assessment of the instrument incubator project.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-020_mod0 CY 3

Task Order Title: Advanced Satellite Aviation Weather Products (ASAP) Applications

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

a) The contractor shall perform or facilitate research related to ASAP applications. ASAP is a collaborative effort with the FAA Aviation Weather Research Program (AWRP) and the interagency Joint Planning and Development Office (JPDO) for the Next Generation Air Transportation System (NextGen) to integrate satellite imagery and sounding data into aviation-related weather products resulting in increased forecast accuracy. The concept is being proven through the enhancement of current aviation-weather products by using existing Geostationary Operational Environmental Satellite (GOES) and NASA research satellite data, and processing techniques to address known aviation hazards such as in-flight icing, atmospheric convective weather, volcanic ash, turbulence, space weather, and the impact of aviation on air quality and climate. This work will also prepare the AWRP product development teams and the JPDO for the next generation of weather data from high-resolution, hyperspectral geostationary satellites. The results will, for example, enable pilots to identify developing weather systems several hours before clouds appear. The contractor shall perform aviation weather applications development, benchmarking, and transition-to-operations research in the following technical areas: in-flight icing; convective weather; aviation turbulence; volcanic ash; ceiling and visibility; space weather; environmental impacts of aviation; aviation weather model development or enhancement; and aviation weather product development or enhancement. The contractor shall develop and implement methods and algorithms for analyzing a variety of satellite data sets relevant to the specific ASAP applications stated above and report findings at technical meetings, conferences, and in journal articles. The contractor shall develop and maintain websites/databases/archives as necessary to document and disseminate datasets and results. The contractor shall conduct a study for developing mesoscale meteorological observations capabilities to meet multiple national needs in support of the NRC/BASC study for the applied sciences program.

b) Provide additional continuing ASAP support to develop specified improved aviation weather products. As directed by the TM, provide products with improved interfaces, quality control processes, and increased timeliness. The additional work may require close coordination between cooperating providers. Specific improved products include volcanic ash flow and DOD hotspot support, tropopause fold turbulence interest field detection and continued mountain wave interest field development, support for interagency JPDO activities related to the Next Generation air Transportation System, continued CoSPA validation ASAP research and transition of related algorithms to operations for the CoSPA as well as for ASAP applications related to in-flight Icing, turbulence and convective weather. Additionally, continue ASAP support to develop specified improved aviation weather products. As directed by the TM, provide products with improved interfaces, quality control processes, and increased timeliness. The additional work may require close coordination between cooperating providers. Specific improved products include volcanic ash flow and DOD hotspot detection, characterization and warnings, tropopause-fold turbulence detection interest fields, continued mountain wave interest field development, support for JPDO Weather Working Group's Environmental Information Team, continued ASAP applications integration into CoSPA and related validation and, finally, continued transition-to-operations research for in-flight Icing, and convective

weather.

c) The contractor shall provide support to US THORPEX, including travel, email, and website support on an ad hoc basis as required by the task monitor.

d) The contractor shall perform system requirements analysis, prototype design concept, preliminary test planning, and estimate development costs for a new instrument concept. The lab prototype of a compact, imaging, gas filter correlation radiometer to measure selected trace gases from geostationary orbit will be used to validate instrument performance models via test results. Provide as deliverables the following: Study report covering system definition and initial design concepts, Prototype Instrument development schedule, and Prototype Instrument development cost estimate.

e) The contractor shall provide support for the NASA Applied Sciences Weather Program Review which will consist of a 2-day review of all NASA Applied Sciences Weather Projects during November 2008. Location: Boulder CO.

f) The contractor shall provide support for Aircraft – Net Enabled Operations (A-NEO) Demonstration, Airborne Web Enabled Weather Probe Test. This support shall consist of the installation and testing of a miniaturized airborne web-server onboard a FAA Technical Center aircraft which will allow airborne systems to be interfaced as Internet nodes in a network-enabled system. Specific guidance will be provided in writing by the technical monitor.

Performance Standards:

- Algorithm approaches are demonstrated and documented within schedules agreed upon between the contractor and the TM
- Demonstrate that algorithms have been implemented properly within schedules agreed upon between the contractor and the TM (schedules designated in monthly reports when appropriate)
- Analysis and interpretations of data are documented and/or presented within schedules agreed upon between the contractor and the TM (schedules provided in monthly reports as needed)
- Websites/databases/archives are updated within timeframe agreed upon between the contractor and the TM

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

The contractor shall submit a detailed task plan for each analysis to the Task Monitor (TM) before starting the work to ensure that the planned effort is aligned with current ASAP objectives and to leverage synergies with other related work.

4.0 Schedule/Milestones/Period of Performance

November 1, 2008 to October 31, 2009

Schedules and milestones are to be agreed upon by the contractor and the TM and will consider rapidly changing objectives and priorities.

5.0 Deliverables/Reporting Requirements

Requirements for specific deliverables such as assessment reports, benchmark reports, validation and verification (V&V) reports, or other forms of documentation will be provided to the contractor by the TM. Formats and schedules for the deliverables will also be provided to the contractor by the TM.

The contractor shall provide a monthly report electronically to the TM summarizing the status on ongoing work, results, and issues.

The contractor shall also present results at technical meetings and publish in journals as appropriate

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-021_mod0 CY 3

Task Order Title: Support for Field Campaign Database Management

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall support the development of a unified airborne observational database. This project is supported by NASA MEaSUREs program and primarily serves the needs of three major modeling communities, i.e., AC&C, AeroCom, and HTAP, to use airborne observations for global and regional model assessment and validation. The contractor shall support this effort by their involvement in activities associated with: 1) compiling publically available airborne data and metadata generated from field campaigns sponsored by NASA, NSF, NOAA, DOE and international partners; 2) analyzing intercomparison data to evaluate the consistency levels between the measurements made from different instruments/aircraft platforms; 3) creating a database including data from multiple airborne platforms and field campaigns; 4) developing web-based tools to allow user retrieving data according to specified temporal and spatial scales; and 5) establishing and maintaining the project website. This project shall require approximately 75% of the contractor's workload. The effectiveness of this project shall be measured through user feedbacks and acknowledgement in publications and conference presentations.

The contractor shall support the development of synergistic data sets associated with atmospheric field campaigns, particularly ARCTAS and POLARCAT partners, focusing on the mission data archival and management (including, archival and access-control of intercomparison data and producing standard and requested data merge products) and enhancement of flight mission data products through inclusion of satellite, sonde, ground-based, and other observational and model data sets. In addition, the contractor shall maintain and update the flight planning software which has been shown to be mission critical in the previous campaigns. This effort is directly supported by NASA TCP as a part of a ARCTAS project and is designed to support satellite instrument validation as well as tropospheric chemistry field studies aimed to gain understanding of the fundamental atmospheric chemical processes relevant to air quality and climate change issues. The availability and usefulness of the data sets shall be measured through science team feedbacks and usage in scientific publications and conference presentations. Since the primary vehicle for delivery of the data sets thus enhanced shall be the World Wide Web, the Contractor shall establish and maintain public websites as well as web-based tools for servicing the enhanced data sets.

Performance Standards

- Monthly reports are submitted to within a 1-week period following the end of each calendar month in accordance with the MEaSUREs requirements. The monthly report containing detailed information on progress on each of assignments, data sets, and future plans are submitted to the TM and copy to project PI and manager.
- Data management resources are made available for field campaigns in a timeframe consistent with

project schedule provided by the TM and/or PIs.

- ☐ Web sites are updated as new data are acquired.
- ☐ Special data requests by PIs are fulfilled consistent with needs of projects.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

Travel:

- ☐ ARCTAS data workshop (estimate two one-week meetings).
- ☐ Earth Science Data System Working Groups (ESDWG) meetings (four days, Fall 2008 and Spring 2009).
- ☐ Federation of Earth Science Information Partners (ESIP) meetings (four days, Winter and Summer, 2009).

4.0 Schedule/Milestones/Period of Performance

5.0 Deliverables/Reporting Requirements

The contractors shall provide the TM and PIs with monthly reports of progresses since last report, future plan, problems encountered and, optional, suggested solutions. In addition, the cost analyses and projections shall also be reported. The contractors shall report monthly metrics to the TM as specified by the Metrics Planning and Reporting Working Group of the Earth Science Data and Information System.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-022_mod1 CY 3

Task Order Title: Air Quality Applications and Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

This task provides scientific computing and analysis capabilities in support of directed and competed activities under NASA's Applied Science Program.

The contractor shall provide analysis and support for NASA Applied Science projects and studies relating to air quality. Analysis and support shall include, but is not limited to algorithm studies; chemical and aerosol data assimilation and modeling; data processing; data base archiving; data fusion projects; data visualizations; web support; meeting support; generation of data specifications and other documentation after discussion with project staff and partners. Data processing support shall include the development, implementation, and testing of algorithms necessary to combine space based observations of criteria pollutants and precursors with relevant ground network data to produce meaningful applied science data product demonstrations for use by other Agencies and the public. This task shall include performing multidisciplinary applied science in the form of quick-turnaround of special tasks, inter-Agency meetings, and other expert scientific fora where flexibility, rapid response, and scientific communication are the key criteria. The contractor shall provide administrative, consulting, outreach, website, and logistical support for applications-related activities. Communications with science and project leads, other applications project leaders, the LaRC DAAC, and others within the government community shall be necessary in support of this effort.

Performance Standards:

Performance is evaluated based on achieving near term goals established by the NASA Technical Monitor and timely and effective closeout of tasks as they are completed.

- Analysis and interpretation of science data are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor.
- Required documents are received within time period requested by NASA Technical Monitor.
- Data bases, web sites, and graphical products are delivered within time period requested by NASA Technical Monitor.
- Field and space mission measurements are captured and archived by agreed upon deadlines between the NASA Technical Monitor and contractor.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 to October 31, 2009.

5.0 Deliverables/Reporting Requirements

The contractor shall support the technical documentation of task outcomes, which identify the quantitative improvement in partner Decision Support Systems deriving from the use of NASA data or model electronically. Key criteria are the quantified benefit and report clarity and brevity. The contractor shall also support peer-reviewed scientific publication and presentation of results. Data products, software (code), and supporting documentation produced in this task shall be delivered to the NASA Technical Monitor within an agreed upon timeframe.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-023_mod1 CY 3

Task Order Title: NAST Science

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide scientific and technical support for the NPOESS and NAST programs; NPOESS is the National Polar-orbiting Operational Environmental Satellite System, and NAST is the NPOESS Airborne Sounder Testbed. This support shall include consultation on science algorithms and data processing concepts for the analysis of field program data, calibration/validation planning, activities associated with NAST-interferometer (NAST-I) instrument performance optimization, and effort devoted toward studying improvements for atmospheric sounding to be considered for the NPOESS 2nd generation system. The contractor shall support up to two field deployments per year by identifying science requirements, planning aircraft flight profiles, and analyzing/interpreting near real-time NAST instrument flight science and engineering data. The contractor shall serve as a member of the NPOESS Sounding Operational Algorithm Team (SOAT) and participate in its meetings by providing NAST flight results and science guidance derived from a knowledge of NAST and NPOESS. The contractor shall support the Integrated Program Office (IPO) in scientific and technical studies and meetings utilizing NAST data as it relates to the NPOESS Preparatory Project (NPP) and NPOESS satellite Cross-track Infrared Sounder (CrIS) instrument development and implementation. The contractor shall also provide technical support and consultation regarding operation and enhancement of the NAST-I instrument performance and associated data calibration processing methodologies.

Performance Standards:

- Attends scheduled SOAT meetings, presents analysis results, and provides scientific guidance for developing algorithms and science criteria.
- Algorithm and data processing concepts are reviewed within schedules agreed upon between the contractor and the Task Monitor (TM).
- Field deployment support is provided per NAST requirements and schedules agreed upon between the contractor and the TM.
- Supports SDR & EDR calibration/validation plan formulation.
- Supports improvements and optimization of the NAST-I instrument.
- Supports instrument inter-calibration activities.
- Supports improvements to and optimization of NAST-I radiance calibration processing.
- Participates in studies addressing improvements for atmospheric sounding to be considered for the 2nd generation NPOESS system.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009

5.0 Deliverables/Reporting Requirements

- Quarterly report to the TM via email or other electronic media covering accomplishments, issues, and plans.
- Science results shall be presented at technical conferences and published in journal articles as appropriate.
- Engineering results shall be reported to the TM and other team members as needed in an agreed upon format.

6.0 Other information needed for performance of task

Travel shall be required for participation in field experiments and team meetings, and to report results. Historically, on average, there has been one deployment per year for 3 weeks in the US or abroad, two team meetings in the DC area, and two technical interchange meetings (one involving foreign travel). Participation in meetings at LaRC shall be required on a semi-regular basis, as needed, to optimize collaborative activities with the LaRC Hyperspectral Remote Sensing team. In addition, efforts associated with improvements to and optimization of NAST-I radiance calibration processing will require travel to collaborate with University of Wisconsin staff, also supporting NAST-I, in Madison, WI.

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-025_mod1 CY 3

Task Order Title: Cloud, Atmosphere, and Surface Remote Sensing

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall perform tasks associated with algorithm development, computer programming, analysis, validation, and internet-based data display and data dissemination for scientific studies, image processing, and data base development and management related to clouds, radiation, aerosol, and aircraft icing research. The contractor shall perform analyses and studies in support of atmospheric sciences research projects and field experiments. The contractor shall summarize work/analyses in memos, reports, meeting proceedings and presentations, or peer-reviewed scientific journals. The tasks include, but are not limited to, the following research areas:

1. Real-time satellite analyses for support of aircraft icing condition diagnoses, field program support, and data assimilation studies.
2. Development and documentation of cloud analysis codes for the NOAA GOES-R project
3. Analysis and comparison of CERES (Clouds and Earth's Radiant Energy System) and Langley geostationary satellite cloud properties with similar cloud properties derived from the Geoscience Laser Altimetry System (GLAS) on the NASA Ice, Cloud, and Land Elevation Satellite (ICESat)
4. Development and testing of cloud property retrieval algorithms for CERES, the Atmospheric Radiation Measurement (ARM), and aircraft icing projects
5. Analysis and comparison of CERES and Langley geostationary satellite cloud properties with similar cloud properties derived from the Cloud Aerosol Lidar and Infrared Pathfinder Satellite (CALIPSO) and CloudSat data
6. Development and application of algorithms to estimate contrail properties from satellite data
7. Development and maintenance of systems to archive and disseminate cloud and radiation products from satellite analyses
8. Construction and application of algorithms to support the NASA Energy and Water System (NEWS) program and Modeling and Analysis Program (MAP)
9. Calibration of operational and research satellite imagers dedicated to weather and climate problems
10. Validation of satellite-derived cloud and radiation products
11. Development of methods to derive improved ice crystal and non-ice particle information from satellite data.

Performance Standards:

- Algorithm approaches and computer code are demonstrated and documented within schedules as agreed to between the contractor and the Technical Monitor (TM).
- Standard data products are delivered within schedules as agreed to between the contractor and the TM.
- Computer software and data files are accurately and seamlessly transferred to the NASA user of those files.
- Analysis and interpretations of science data are documented in presentations and scientific publications and/or presented within agreed upon schedules provided in monthly reports as needed.
- Websites/databases/archives are updated within schedules as agreed to between the contractor and the TM.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009

The schedule and milestones will be provided to the Contractor by the NASA Technical Monitor as required.

5.0 Deliverables/Reporting Requirements

- Standard data products in digital and image formats for archival, dissemination, and internet access
- Computer code and supporting documentation
- Publications as needed to document and present methods and results.
- Other deliverables and reports as requested by the NASA Technical Monitor to meet ad hoc requirements. Contractor shall be provided the criteria and acceptable format by the NASA Technical Monitor for these requests.
- Travel as needed to support field programs, present results, and participate in workshops and science team meetings. Exact locations and dates are to be determined.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-026_mod1 CY 3

Task Order Title: SABER Extended Mission Data Analysis

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

Background Information

The Sounding of the Atmosphere using Broadband Emission Radiometry (SABER) Experiment was launched upon the NASA Thermosphere Ionosphere Mesosphere Energetics and Dynamics (TIMED) satellite in December, 2001. SABER is making unprecedented measurements of the Earth's stratosphere, mesosphere, and lower thermosphere. The TIMED mission was approved for its third extended mission phase in May of 2008, for an additional 4 years, to conclude at the end of government fiscal year 2012. At present the SABER data record is approaching 7 years in orbit. The extended mission will enable up to 11 years of observations, a complete solar cycle's worth of data. It is a condition of the extended mission that the quality of the dataset continues to be assessed and that scientific investigations with these data are to be conducted.

Task Description

The contractor shall work with SABER Level 1, Level 2, and Level 3 data products in assessing the quality of these data products and in ascertaining their long-term trends. The contractor shall participate in scientific studies of the data and contribute to the development and publication of the results in the scientific literature. The contractor shall modify and test existing algorithms as dictated by comparisons with correlative data or other information.

Performance Standards

1. Methodology is demonstrated and documented within agreed upon schedules.
2. Analysis and interpretation of scientific data are documented within agreed upon schedules.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

The contractor shall support SABER science team meetings and other technical interchange meetings as required. For planning purposes one meeting per year in Boulder, CO should be assumed. Other meetings will likely take place in the Hampton Roads area and require no travel support.

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009.

5.0 Deliverables/Reporting Requirements

The contractor shall provide bi-monthly reports of status and accomplishments for the task electronically to the NASA Technical Monitor.

Informal oral meetings will be held between the contractor and the NASA Technical Monitor at the request of the NASA Technical Monitor as required.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-027_mod2 CY 3

Task Order Title: Earth Science Education

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall perform tasks associated with development and operation of education and outreach projects and activities related to atmospheric science, such as Students' Cloud Observations Online (S'COOL), Mentoring and inquirY using NASA Data on Atmospheric and Earth science for Teachers and Amateurs (MY NASA DATA) and similar projects that may arise in the future.

The contractor shall provide on-going support (such as responding to email and phone call requests and questions, preparing and sending mailings, and recording information in various databases) for educators participating in the projects.

The contractor shall assist in planning and logistics, and be part of the team that conducts teacher workshops related to the projects (including defining the agenda, contacting appropriate organizations to publicize the workshops, helping prepare the application forms, reviewing and selecting applicants, preparing materials, developing instructional presentations, delivering instruction, and on-going interaction with workshop alumni).

The contractor shall attend local, regional and national meetings to present the project, as determined and agreed by the project team, or shall support participation at these meetings by teacher ambassadors (including preparing and sending project materials for handout at the meeting). The number and location of meetings supported shall be determined annually based on the level of funding available and the specific theme of the upcoming meetings. Typically several local, state and regional meetings are selected each year.

The contractor shall help update lesson plans; help populate a science glossary for an upper elementary level audience; and help develop new media products for S'COOL and MY NASA DATA exploiting multimedia, social networking, telepresence, and other new media tools.

The contractor shall complete revision to two guides entitled, "Using sensitive plants as bio-indicators of ozone pollution" and "Using ozone tolerant and sensitive snap beans as bio-indicators of ozone air pollution". Also, the contractor shall provide consultation on the design of a website/database and the establishment of an ozone garden at NASA LaRC. The purchase of miscellaneous materials and travel may be required to support this effort.

Performance Standards:

- Educational materials developed are aligned to national and Virginia educational standards, and meet standards of quality set by the projects.
- Participants are registered or assisted within a week.
- Websites/databases/archives are updated within an agreed timeframe.
- These times will vary from near-instantaneous for web-connected databases, to less than a week for updates requiring manual intervention, to agreed longer timeframes when major changes to a website or database are contemplated.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

Contractors may be required to sign a Non-Disclosure Agreement (NDA) to have access to certain GN&C data.

4.0 Schedule/Milestones/Period of Performance

Period of performance is November 1, 2008 through October 31, 2009

5.0 Deliverables/Reporting Requirements

Reporting on this task shall be done informally, through oral status updates at weekly to monthly team meetings.

The Contractor shall provide a summary of accomplishments electronically as input for a semi-annual report to NASA HQ at an agreed upon schedule between the Contractor and NASA Technical Monitor.

- Deliverables shall include materials for handout at the teacher workshop.
- Deliverables shall also include content and tools (web forms, databases, etc) for project websites and printed project materials.
- Deliverables shall be submitted to the NASA SMD-Earth Science Education Products Review by the agreed upon dates.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-028_mod1 CY 3

Task Order Title: Cloud Object Modeling and Analysis

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall:

- a) Develop, produce, and maintain software for generating cloud object data sets from CERES satellite footprint data and European Center for Medium-range Weather Forecasts (ECMWF)/Goddard Earth Observing System (GEOS) meteorological data.
- b) Produce the advective forcing data from the ECMWF data using the Colorado State University (CSU) general circulation model code for a two-year Terra period.
- c) Produce publication-quality cloud object data sets using the cloud object software and data quality control procedures.
- d) Analyze cloud object data for understanding cloud feedbacks and for model evaluation and produce journal and publications to present the analysis results as appropriate.
- e) Develop, produce, and maintain (i) cloud object Web site, (ii) cloud object database, and (iii) web-based cloud object data retrieval, visualization, and analysis system.
- f) Develop and improve cloud-resolving model components and perform simulations using various data sets available, including the cloud object data.
- g) Incorporate the higher-order turbulence closure scheme to the vector vorticity cloud model (VVM) from CSU and develop a low-order turbulence closure based on the turbulence enstrophy for the same model.
- h) Complete and analyze simulations of 100's boundary-layer cloud objects with the LaRC cloud resolving model.
- i) Document methods and results of analyses by providing electronic copy of annotated computer code and a written description of methods and equations. Methodology can be documented via publications or papers.

The performance standards are as follows:

- Algorithm approaches are demonstrated and documented within agreed upon schedules.
- Demonstrate that algorithms have been implemented properly within agreed upon schedules designated in monthly reports when appropriate.
- Designated operational algorithms, once developed, are maintained under proper configuration management procedures and can be reproduced (if lost) within an agreed to timeframe designated in monthly reports when appropriate.
- Analysis and interpretations of science data are documented in presentations and scientific publications and/or presented within agreed upon schedules provided in monthly reports as needed.
- Author or substantially contribute to at least one paper or journal article each year.
- Websites/databases/archives are updated within an agreed to timeframe provided in monthly reports as needed.
- Report cloud model development and improvement results at scientific, workshops, and peer reviewed scientific publications.
- Complete draft of paper or presentation within 3 months of completing an analysis which yields reportable results.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

- Period of performance: November 1, 2008 to October 31, 2009
- Schedules will be agreed to monthly between the contractor and the TM.
- Present progress and preliminary results at monthly group meetings at 9 a.m. on the third Tuesday of each month beginning in November 2008 (or as otherwise notified by the TM to accommodate schedule conflicts).

5.0 Deliverables/Reporting Requirements

- Written or oral status reports at the monthly group meeting are required to report progress, problems, results, and schedule issues. Biweekly updates on progress from individual researchers should be sent to TM via emails.
- Finalize the analysis of gridded (tropical deep convective) cloud objects for the Terra (2 yrs) period and matched atmospheric state data by May 31, 2009.
- Finalize the analysis of ECMWF atmospheric state data for boundary-layer cloud objects from the two-year Terra period by May 31, 2009.
- Finalize the analysis of ECMWF dynamic forcing data for TRMM boundary-layer cloud objects from the TRMM period by May 31, 2009.
- Finish the processing of tropical deep convective cloud objects for the three year Aqua data by October 31, 2009.
- Partially release the Terra and Aqua tropical and boundary-layer cloud object data by October 31, 2009 on the cloud object Web site.
- Release the preliminary version of the coupled higher-order closure and VVM (Vector Vorticity Model) cloud model to CMAP Science Team by Feb. 28, 2009.
- Develop a low-order turbulence closure model for VVM based upon the turbulence enstrophy idea by October 31, 2009.
- Submit the gridded cloud object paper by November 15, 2009.
- Complete and analyze simulations of 100's boundary-layer cloud objects with the LaRC cloud resolving model by October 31, 2009.
- Attend and present papers at scientific meetings and CERES science team meetings as appropriate to present significant results from analyses.
- Publish papers in scientific journals from finished work. Initial draft of a paper is to be submitted to the TM within 3 months of the final results being presented at a monthly group meeting.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-029_mod1 CY 3

Task Order Title: Cloud Radiation, Precipitation, and Feedback Studies

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide computer programming and data analysis support for science studies of clouds, precipitation, and climate feedback using a variety of EOS and other satellite instrument data sets including CERES, passive radiometer, microwave imager, and microwave radiometer data. The contract shall develop and document data analysis algorithms, write computer code based on the algorithms, and implement the algorithms to analyze the scientific data sets. The contractor shall interpret and document the analysis results.

NASA LaRC Science Directorate (SD) is interested in assessing the performance (reflection, transmission and emission) of mesh reflector material that will be used as the reflector surface for Large Deployable Arrays (LDA; i.e., large deployable antenna) in the Soil Moisture Active/Passive (SMAP) mission and other radiometric applications. To be useful for radiometric applications, the reflectivity of a reflector surface will be near unity, and the emissivity of the surface must be small and stable. Reflector material with losses that would have no impact on communications applications will be of major importance for microwave radiometer systems utilizing mesh surfaces. Of particular interest is the mesh surface that will be used for the NASA SMAP mission. LaRC is specifically interested in the development of a measurement approach to quantify the performance of potential materials including meshes for surfaces of LDA in passive remote sensing applications in support of the SMAP mission requirements.

The contractor shall perform the following task requirements associated with SMAP:

The contractor shall develop an approach to characterize the radiometric properties of thin, highly reflective material (e.g., mesh) samples. The measurement systems shall provide estimates of emissivity of the thin samples from 1.1 to 2 GHz (L-band). Estimates of the reflectivity and transmissivity of the samples of the same frequency range are desirable. The contractor shall provide an assessment of the expected performance of the measurement approach including, but not limited to, an error model and calibration approach consistent with highly reflective samples and estimating.

The contractor shall establish the experimental measurement system and demonstrate the performance of the measurement approach. Testing shall be performed to assess precision and accuracy of the emissivity measurements and results shall be documented. Testing shall also be performed to characterize the emissivity of mesh samples provided as Government Furnished Equipment (GFE) by LaRC. The emissivity of approximately 6 to 10 mesh samples will be characterized.

The contractor shall provide analysis support to LaRC SD to develop a quantitative approach in the assessment of the impact of the emissivity of the reflector on the overall radiometric error budget for future SMAP spacecraft, especially the antenna (or LDA), concepts. It is expected that LaRC will develop a model of the on-orbit performance of a LDA sensor for SMAP applications. This model will include the thermal variation of a mesh reflector expected orbit parameters and mesh properties. The contractor shall provide radiated emission estimates from the reflector thermal-distribution predictions and support the radiometer calibration modeling using these LaRC thermal and spacecraft models.

Performance standards are as follows:

- Algorithm approaches are demonstrated and documented within agreed upon schedules
- Demonstrate that algorithms have been implemented properly within agreed upon schedules (schedules designated in monthly reports when appropriate)
- Analysis and interpretations of science data are documented and/or presented within agreed upon schedules

(schedules provided in monthly reports as needed)

- Databases/archives are updated within an agreed to timeframe (schedules provided in monthly reports as needed)
- All reports shall be delivered by the contractor at the schedule agreed to between the NASA Technical Monitor and the Contractor.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009

5.0 Deliverables/Reporting Requirements

Deliverables include the established concept of highly accurate mesh reflection measurements, developed system design and lab setup procedures for the measurements, data processing algorithms, quantified mesh characteristics, analysis results, and inputs for papers and presentations. Deliverables will be in the form of electronic computer codes, illustrations of measurement concept, environments, and lab setups, plots of key variables to illustrate results, and datasets and plots of analysis results suitable for publication along with detailed explanations of the materials presented. Schedules will be negotiated and agreed on with the TM. A written or oral monthly report on status, progress, and results is required by the end of each month.

Reports for the characterization of reflector materials used by the SMAP mission activities are as follows:

- Description of measurement approach
Discussion and Power Point slides describing the Measurement Apparatus to characterize the LaRC mesh samples. This presentation will include a discussion of the major error sources and the expected fidelity of the emissivity measurements.
- Preliminary Mesh Measurement results
Discussion and oral presentation describing the measured emissivity data for GFE mesh samples. This briefing shall include, but not be limited to, the present measured emissivity and any detectable changes in the mesh performance.
- Final Report
The final report shall include a description of the measurement apparatus, a discussion of the error sources and calibration, and the measured mesh emissivity as well as reflectivity and transmittance of mesh materials.

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-030_mod0 CY 3

Task Order Title: Ionosphere Response

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

Background

The work to be performed pertains to completing the remaining tasks for year three of a 3-year proposal awarded to the NASA task monitor to study the response of the ionospheric E-region to solar-geomagnetic forcing observed during the April 2002 and October-November 2003 solar storms. The observations of the E-region response are obtained from measurements taken by the NASA Sounding of the Atmosphere using Broadband Emission Radiometry (SABER) satellite instrument, the Global Ultraviolet Imager (GUVI) satellite, and the NOAA Polar Orbiting Emission Environmental (POES) satellites. The E-region response shall be studied using the above satellite data combined with plasma and radiative transfer models. The models are already in-hand.

Description of effort

The contractor shall: (1) develop, test, and assist in integration of computer software analysis tools that use the SABER, GUVI, and POES data; (2) Perform analysis of science data to understand E-region processes; and (3) process large data sets through various programs to reach a dataset that can be compared against observations. This shall include the following:

- Algorithm testing and processing of space-time mapping of SABER temperature, pressure, and chemical composition data and GUVI O/N₂ ratios during the April 2002 and October-November 2003 solar storms.
- Algorithm testing and processing of space-time mapping of NOAA/POES total energy flux and characteristic energy during April 2002 and October-November 2003 solar storms.
- Interface NOAA/POES total electron energy flux and characteristic energy data with the field-line interhemispheric plasma (FLIP) model.
- Develop batch scripts and execute FLIP model to produce a global dataset of key E-region ion and neutral species concentrations during the April 2002 and October-November 2003 solar storms.
- Develop SABER data processing algorithms and create visualization software for displaying data and model results.
- * Download Incoherent Scatter Radar (ISR) measurements of electron density and plasma temperatures
- * Compare ISR electron densities and plasma temperatures with analogous FLIP simulations during geomagnetic storm periods
- * Compare coincidence SABER storm-to-quiet ratio (SQR) of NO⁺(v) volume emission rate with ISR SQR of electron densities during geomagnetic storm periods

Performance Standards

- Algorithm approaches are demonstrated and documented within agreed upon schedules.
- Demonstrate that algorithms have been implemented properly within agreed upon schedules.
- Process data and provide results within agreed upon schedules

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance November 1, 2008 through October 31, 2009

5.0 Deliverables/Reporting Requirements

Contractor shall provide following deliverables upon completion:

- Database of NO+(v) 4.3 um volume emission rates during the April 2002 and October-November 2003 solar storms derived from SABER 4.3 um limb emission measurements
- End-to-end model simulation of E-region 4.3 um limb radiance during the April 2002 and October-November 2003 solar storms.
- * Databases and plots of SABER NO+(v) and ISR electron density SQR comparisons for coincident measurements during October-November 2003 solar storm periods. Similar comparisons for other important storm periods between 2002-2007 may be necessary also.
- * Simulations, data analysis, and plots, analogous to those identified above, to support journal articles.

Reporting Requirements:

- Contractor shall provide monthly reports on status and progress. These reports shall be provided electronically by the contractor.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-031_mod0 CY 3

Task Order Title: DEVELOP National Program Student Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

a. Description of Contractor Work

DEVELOP is an applications support activity sponsored by the NASA Science Mission Directorate Applied Sciences Program. DEVELOP extends NASA science research enabling the advancement of science and technology to benefit society and improve human quality of life. DEVELOP, managed by a combination of federal, state, and local government, university and industry professionals, supports students who demonstrate to community leaders prototype applications of NASA science measurements and predictions addressing local policy issues.

This task order establishes Contractor tasks for DEVELOP Program activity. The Contractor shall plan and organize national activities to include participation in scientific and governing agency conferences, lead weekly National Program meetings, and deliver presentations to high-level NASA officials. The Contractor shall mentor and guide students throughout project execution. The Contractor shall be responsible for editing and proofreading students' technical papers and abstracts for publication at scientific and public policy forums, and ensuring that the NASA DEVELOP Program activities align with those of NASA's Applied Sciences Program.

The Contractor shall support the NASA Applied Sciences Program through assistance such as generation of the NASA National Application Fiscal Year Program Plans, logistical support at solicitation panel reviews, and analysis of benchmark reports from NASA-funded projects, among other activities. Contractor tasks also include supporting the Science Directorate at NASA Langley with projects such as NASA scientist publication record analysis and conference planning and support. The Contractor shall be responsible for all administrative support necessary to pay student researchers, arrange for travel, obtaining supplies and equipment, and other related program expenses.

b. Description of Student Consultant Work

Students in the DEVELOP Program shall collaborate to integrate NASA space-based Earth observation sources into partner agencies' science data, models and decision support tools. These collaborations result in rapid prototype projects that address local policy and environmental issues. Students shall present visual products demonstrating the application of NASA scientific information to community leaders at scientific and public policy forums such as the American Geophysical Union (AGU), the American Meteorological Society (AMS), and the Southern Growth Policies Board (SGPB). Submission of written products to peer-reviewed scientific publications and other public databases is also expected.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

Because of the nature of the work, the Contractor shall be capable of making rapid travel and procurement related obligations to support student project activities such as air transportation, hotel rooms, registration fees, supplies, conference expenses, etc. therefore the Contractor shall maintain the necessary commercial credit cards to facilitate this activity.

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009

December 15 - 19, 2008 AGU Fall Meeting in San Francisco, CA

January 11 - 15, 2009 AMS Annual Meeting in Phoenix, AZ

March 8 - 13, 2009 ASPRS Annual Conference in Baltimore, MD

June 2009 SGPB Annual Conference, Location TBD

5.0 Deliverables/Reporting Requirements

The Contractor shall support DEVELOP by achieving:

- 20 applied prototype projects as defined by the NASA's Applied Sciences Program (<http://science.hq.nasa.gov/earth-sun/applications/cross.html>)
- 15 visual products incorporating NASA Earth Observation System and partner organization data
- 10 abstracts based upon student research results submitted for publication
- One Hundred program term participants per year
- Demonstrate research results at three high-level science and policy forums including those mentioned under schedule and milestones

Contractor deliverable requirements also include the creation and modification of DEVELOP informational materials, such as a multimedia presentation CD, brochures, flyers, and the DEVELOP website (<http://develop.larc.nasa.gov>). Additional deliverables consist of NASA researcher publication evaluation reports and analysis reports of benchmark papers from NASA-funded projects.

The student deliverables and reporting requirements include:

- Team technical paper at the conclusion of each rapid prototype project
- Visualization of research results
- Submission of project abstract for publication
- Project Presentation

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-034_mod0 CY 3

Task Order Title: Applied Sciences Solutions Networks

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide support to the emerging Climate area for the Applied Sciences program's National Applications of National priority. These activities are expected to end during this performance period; possibly at the end of December 2008.

Performance Standards:

- 1) All reports are delivered within the timeframe and format agreed to between the NASA TM and the contractor

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A.

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009.

Work is expected to be completed under this task sometime during this period of performance; possibly as early as the end of calendar year 2008.

5.0 Deliverables/Reporting Requirements

Deliverables shall consist of reports from climate-related meetings and conferences, which shall be provided by email to the Applied Sciences program management, as well as the TM.

6.0 Other information needed for performance of task

None.

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-035_mod0 CY 3

Task Order Title: Airborne Science Data Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

Provide technical support to the ASCENDS project including project planning and controls and the support for airborne field experiments.

Tasks

1. The contractor shall provide support for ASCENDS focus group activities, development of staffing plans, and support for development of proposals to NASA HQ and other funding opportunities.
2. The contractor shall design, certify, and fabricate a seat rail accommodations to interface the ASCENDS 4-bay rack to the NASA P3 aircraft. The ASCENDS 4-bay rack was previously designed, certified, and fabricated for accommodating 3 19-inch "Bud Boxes" and 1 telescope on the the NASA B200 and UC-12 class aircraft. This task replaces the existing rack sliders with slider designed for the NASA P3 seat rail system.
3. The contractor shall provide access to project management and coordination, working with NASA-designated personnel, to ensure communication of requirements and resolution of any associated issues and shall be available for technical and program interface via teleconferencing or face-to-face meetings at the vendor's facility to update schedule and activity status.
4. The contractor shall provide on-site access to NASA-designated personnel to include engineering, maintenance, and quality assurance.
5. The contractor shall provide copies of all documentation in support of this contractual effort, including all drawings, approvals of task modifications, all substantiation analyses, and all quality-assurance approvals.
6. The contractor shall provide copies of all signed documents and four copies of all engineering drawings (two full size and two half size) in accordance with accepted aerospace industry standards.
7. The contractor shall provide electronic copies of all electronic documents in PDF format.
8. The contractor shall provide electronic copies of electronic drawings in AutoCAD-compatible format.
9. The contractor shall yield all final quality assurance approval authority for all inspected work to NASA quality assurance personnel.

Note: NASA's quality assurance authority is limited to normal quality control issues and does not allow NASA to change FAA-approved design data and/or installation drawings or procedures.

10. The contractor shall secure written approval from the NASA Contracting Officer prior to commencing any work activities beyond the scope of this SOW.

Note: All work performed by the Contractor without prior written approval from the NASA Contracting Officer is at the sole risk of the Contractor.

Government Furnished Equipment

- NASA interface control documents describing P3 seat rail system.

The contractor shall deliver the following:

- One set of 4-bay rack accommodations for installation in the NASA P3 aircraft as modified per this SOW.
- Copies of all documentation in support of this contractual effort, including all drawings, all correspondence approving task modifications, all substantiation analyses, and all quality-assurance approvals.
- Copies of all signed documents and four copies of all engineering drawings (two full size and two half size) in accordance with accepted aerospace industry standards.
- Electronic copies of all electronic documents in PDF format.
- Electronic copies of electronic drawings in AutoCAD-compatible format.

2.2 Quality and Performance Standards:

The contractor shall follow its rigorous ISO, safety, and IT security standards. General quality standards are presented in the STARSS Quality Plan. Specific task quality requirements are established with the TM on a continual basis during the performance of the task.

Performance is monitored through periodic reviews with the TM and through formal semiannual surveys.

Baseline standards include:

- Plans, proposals and presentation material are documented and/or presented within schedules agreed to between the NASA Technical Monitor (TM) and the contractor.
- Engineering drawings are produced in accordance with accepted aerospace industry standards.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

Data produced under this task include export controlled technology. Export control is addressed in Section 9.3 of this task plan. No foreign nationals are used on this task.

4.0 Schedule/Milestones/Period of Performance

Period of Performance is 11/1/2008 through 10/31/2009.

Task milestones and schedule will be established by the TM and agreed to by the contractor in monthly planning and coordination meetings.

5.0 Deliverables/Reporting Requirements

The contractor shall provide quarterly progress reports of the task status of accomplishments electronically to the NASA TM. The status of ongoing tasks, results, and issues shall be reported to the TM through informal oral status meetings.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-037_mod2 CY 3

Task Order Title: CEOS Science and Engineering Consultation

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The Committee on Earth Observation Satellites (CEOS) is an international organization focused on optimizing the benefits of spaceborne Earth observations through the design, implementation and coordination of satellite and instrument systems. NASA LaRC is the lead of the CEOS Systems Engineering Office (SEO), which provides systems engineering leadership, provides a framework for a coherent science and engineering plan, and provides decision support tools for trade studies and the assessment of execution options to maximize the probability of their implementation. Science and engineering technical consultation are required to conduct assessments, develop CEOS constellation requirements and perform systems engineering trade studies of constellation options. The unique skills and capabilities of the science and engineering consultants under this task order are critical to the objectives of the CEOS organization. NASA Langley Research Center (LaRC) will coordinate the release of any information resulting from this task to the CEOS organization.

The contractor shall develop a system requirements database of space-based CEOS missions, perform gap assessments, develop web-based communication and decision support tools, support the development and maintenance of technical content on the CEOS website, support the Atmospheric Composition Constellation, participate in meetings with LaRC and other CEOS organizations, and complete reports to document results. The milestones listed in Section (4) of this Task Order Statement of Work shall be coordinated closely with the NASA Technical Monitor (TM).

The contractor shall provide technical review and assist with the standardization of terminology in CEOS database inputs, and provide advice on inputs to the SEO Systems Database.

The contractor performance shall be evaluated on:

- Completion of assessments and final reports according to the schedules agreed upon by the NASA Technical Monitor and contractor.
- Completion of informal status reports summarizing the work completed and future plans according to the schedules agreed upon by the NASA Technical Monitor and contractor.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009

(1) Action Tracking Tool - March 1, 2009

Complete an updated release and final documentation for the CEOS Action Tracking Tool developed by SSAI in 2008. The report shall include a summary of the development tools, approach and any necessary information for future transition of this tool to other developers.

(2) System Requirements Database, Release 2 - March 1, 2009

Complete release-2 of the CEOS System Requirements database prior to the CEOS SIT-23 meeting. This release should include all missions, instruments and measurements for CEOS. Include documentation for the content of the database and the linkages between elements. In addition, include an updated assessment of gaps and recommendations for CEOS as well as a plan for new database features.

(3) System Requirements Database, Release 3 - September 1, 2009

Complete release-3 of the CEOS System Requirements database prior to the CEOS SIT-24 meeting. This release should include updated content for missions, instruments and measurements as well as new content for decisions, information products and models. In addition, include an updated assessment of gaps and recommendations using the new content. Database content and features shall be coordinated with the EO Handbook and other CEOS groups such as GEO, WMO and GCOS.

(4) Atmospheric Composition Constellation Project Support - August 31, 2009

Conduct a statistical evaluation of the developmental automated aerosol forecast products deployed during 2008 NASA and NOAA field campaigns in support of the CEOS ACC Smoke/Aerosol Forecasting pilot project, and report on the results. Support the submission of a ROSES proposal to the Applied Sciences, Decision Support task for global web-based satellite aerosol product distribution.

(5) Action Tracking Tool Maintenance - October 31, 2009

Maintain the operation of the CEOS Action Tracking Tool including minor updates for enhanced functionality and the repair of problems, as they arise. This will be an ongoing task for the contract period, requiring approximately 10% FTE effort.

(6) CEOS Website Maintenance - October 31, 2009

Maintain the technical content and add new technical content (as needed) to support the CEOS website. This will be an ongoing task for the contract period, requiring approximately 40% FTE effort.

(7) CEOS Constellation and Working Group Support - October 31, 2009

Support various CEOS constellation and working groups by participating in meetings, developing requirements, conducting gap analyses and supporting projects. This will be an ongoing task for the contract period, requiring approximately 60% effort.

5.0 Deliverables/Reporting Requirements

The contractor shall provide periodic (1-2 months) informal status reports to the Task Monitor (TM) to summarize the work completed and future plans. The contractor shall provide technical reports (science and engineering) to NASA upon the completion of technical meetings, science or engineering analyses, or upon completion of NASA or CEOS documentation review. As a technical consultant to NASA, the contractor shall provide recommendations and assessment of the CEOS program and Constellation plans.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-038_mod0 CY 3

Task Order Title: Magnetic Storm Correction to IRI Model

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The work to be performed pertains to scientific programming support for a 3-year proposal to develop an empirical ionospheric E-region storm-time correction to the International Reference Ionosphere (IRI) model. Observations from the NASA Sounding of the Atmosphere using Broadband Emission Radiometry (SABER) instrument onboard the Thermosphere-Ionosphere-Mesosphere Energetics and Dynamics (TIMED) satellite will be used to correct the E-region IRI NO⁺ and electron densities for solar-geomagnetic activity. The proxy used for the E-region response is the NO⁺(v) 4.3 um volume emission rate (VER), which will be derived during all magnetically disturbed periods contained in the SABER database from 2002-2007. The NO⁺(v) 4.3 um VER will be used to derive a parameterization of the E-region response to solar-geomagnetic storms as a function of integral ap-index. The parameterization of the E-region response to solar-geomagnetic perturbations will be integrated into the IRI model and validated by comparisons with SABER-derived NO⁺(v) 4.3 um VER, incoherent scatter radar (ISR) measurements, and results from the Ionosphere Model for Auroral Zone (IMAZ).

The contractor shall: (1) run the NO⁺(v) 4.3 um VER code for quiescent, nighttime conditions over the 2002-2007 time period; (2) filter and process SABER data for magnetically disturbed periods from 2002-2007; (3) test and assist in the integration of scientific software to derive the E-region storm-time correction factors; and (4) assist in the validation of the E-region storm-time correction model.

Performance Standards

- Algorithm approaches are demonstrated and documented within agreed upon schedules.
- Demonstrate that algorithms have been implemented properly within agreed upon schedules.
- Process data and provide results within agreed upon schedules

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of performance is November 1, 2008 through October 31, 2009.

- Calculate quiescent, nighttime NO⁺(v) 4.3 um VER, using existing software, for 2002-2007 time period
- Filter and process SABER data for all magnetically disturbed periods in the 2002-2007 period
- * Test and assist in the integration of scientific software to derive the E-region NO⁺ and electron density storm-time correction factors.
- * Derive the storm-time correction factors by processing all magnetically disturbed periods in the SABER database from 2002-2007.

5.0 Deliverables/Reporting Requirements

Contractor shall provide following deliverables upon completion:

- Database of calculated quiescent, nighttime SABER-derived NO+(v) 4.3 um VER from 2002-2007
- Database of SABER input data for storm model development for magnetically disturbed periods from 2002-2007

* Tested and integrated

software to derive storm-time correction factors using SABER data from 2002-2007.

* Database of statistical

fit-parameters, derived from SABER NO+(v) 4.3 um VER, to correct the E-region NO+ and electron densities during solar-geomagnetic storms.

Reporting Requirements:

- Monthly reports on status and progress
- Algorithm approaches are demonstrated and documented within agreed upon schedules.
- Demonstrate that algorithms have been implemented properly within agreed upon schedules.
- Process data and provide results within agreed upon schedules

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-039_mod1 CY 3

Task Order Title: Science Directorate Development of New Business Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide support for development of new business to the Science Directorate by the following:

- Developing instrument measurement concepts and preliminary designs
- Supporting proof of concept tests
- Reviewing and commenting on presentations, documentation and correspondence to potential new business sponsors.
- Participate in planning and status meetings
- Assist with preparation of operational and development documentation
- Provide technical consultation on potential Science Directorate New Business opportunities and investments.

The contractor shall provide scheduling support for various Science Directorate projects. Provide project schedules and what if analyses scheduling scenarios for projects in order to adjust project priorities or to regain schedule slippage. The contractor support must be proficient in the use of P3 and Microsoft Project.

SAGE-III/ACE stratospheric profiling mission feasibility study

The contractor shall provide support of technical accommodation and cost studies for a potential SAGE-III/ACE stratospheric profiling mission as recommended by the Earth Science Subcommittee of the NASA Advisory Council. This mission, which utilizes a spare SAGE III flight instrument stored at NASA LaRC, is being considered as a new decadal survey mission with launch anticipated in 2013 in order to comply with Congressionally-mandated requirements for monitoring the stratospheric ozone layer. The technical and cost assessment support shall include but is not limited to the following activities:

Support detailed post storage test planning;

Support detailed heritage assessment planning;

Support mission feasibility study support with NASA LaRC and NASA GSFC;

Support the development of technical plans and corresponding cost estimates necessary to meet the 2013 mission launch readiness date.

Travel to NASA GSFC to support mission design trade studies (one or two persons for one week) may be required as part of this effort.

Performance Standards

The contractor performance shall be evaluated on:

- Analysis and interpretation of science data are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor
- Required documents are received within time period requested by NASA Technical Monitor

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of performance is November 1, 2008 through October 31, 2009.

The schedule and milestones will be provided to the Contractor by the NASA Technical Monitor as required.

5.0 Deliverables/Reporting Requirements

Contractor shall provide a written progress report of status and accomplishments on a semi-annual time basis electronically to the NASA Technical Monitor

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-041_mod1 CY 3

Task Order Title: CERES FM-5 on NPP Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall perform tasks to modify existing algorithms and codes to support the Clouds and the Earth's Radiant Energy System (CERES) FM-5 instrument flying on the NPOESS Preparatory Program (NPP) satellite. This includes FM-5 related scientific and engineering studies leading up to launch and post-launch calibration and analysis.

2.1 Technical/Science Support. The contractor shall perform analyses to establish accurate calibrations for the FM-5 CERES instrument. The contractor shall monitor ground and on-orbit instrument operations and provide support for identifying and implementing any required actions including actions associated with spacecraft maneuvers. The contractor shall perform cost, programmatic, and engineering trade analyses utilizing historical CERES and ERBE project data to facilitate development, acquisition and deployment of Earth Radiation Budget instruments/missions. The contractor shall perform tasks associated with development and implementation of the CERES cloud retrieval subsystem; development of angular distribution models and TOA flux subsystem; development of the SARB subsystem including surface-only algorithms; development of TISA algorithms and subsystems. The contractor shall perform analyses to investigate fusion of measurements from different instruments to study cloud 3-D effects; and determine the atmospheric response to rapidly changing sea ice cover in polar regions. The contractor shall study the performance of radiometric instruments in low-temperature and low-pressure environments for potential applications in polar regions and on high altitude platforms. The contractor shall develop and apply radiative transfer models to study cloud radiative effects at the top of the atmosphere and the surface. The contractor shall investigate aerosol and cloud interactions using satellite and surface observations. The contractor shall perform tasks associated with algorithm development, computer programming, analysis, validation, and internet-based data display and data dissemination for scientific studies related to the CERES project. The contractor shall perform radiative transfer studies, parametric analyses of radiation processes, cloud algorithm development, verification, and validation, related atmospheric studies, and visualization of results. The contractor shall summarize work/analyses in memos, reports, or peer-reviewed scientific journals. Additional services may be required to support targeted CERES cloud and ice studies – in particular, liaison with CNES to facilitate science data interaction with institutions in France. The contractor shall provide asset management, software maintenance and license renewal tracking.

2.2 Data Management Support. The contractor shall provide the following Clouds and the Earth's Radiant Energy System (CERES) Data Management (DM) support:

Convert each subsystem's code, as directed by the respective Subsystem Working Group Chair, to accept inputs from the NPP satellite instruments in order to produce data products which are consistent with the existing CERES data products. Code Conversion shall be accomplished to meet the schedules provided by the NASA Technical Monitor.

Provide coordination of FM-5 contractor data management effort, in conjunction with existing CERES organization and processes. Maintain the modified science data processing codes for implementing CERES algorithms into Data Management Systems. The operational code must execute correctly at both the Science Computing Facilities and the Langley Tropical Rainfall Measuring Mission (TRMM) Information System (LaTIS) at the Atmospheric Science Data Center (ASDC). The contractor shall provide support for software design, development, implementation,

testing, validation, configuration management, and documentation for processing and analyzing CERES FM-5, including both pre-launch testing and on-orbit operations. Provide validation processing for data products at the Science Computing Facilities as required. FM-5 documentation may include updates to existing data products catalogs, interface requirements, data management plans, ancillary input data, quality assessment plans, coding guidelines, software design documents, validation documents, test plans, operator's manuals, data set collection guides, and other documentation as needed to satisfy project/program requirements. The contractor shall support CERES DM activities as indicated in the subsections below.

2.2.1 Code Development

Consistent with requirements and priorities established by the CERES Subsystem Working Group Chairpersons, the contractor shall perform code development and maintenance for production and analysis codes. The contractor shall support code delivery of production codes to the ASDC for data product production in accordance with the CERES Code Delivery Process. The contractor shall develop and support on-production codes, consistent with the CERES Data Management and Configuration Management Plans, and consistent with requirements established by the Chairpersons. The contractor shall support code and algorithm reviews and evaluations as required by the Task Monitor, CERES Data Management Team Lead or CERES Principal Investigator.

2.2.2 Develop and maintain documentation for the CERES Subsystem Codes.

In response to the technical requirements of the CERES Working Group Chairpersons, the contractor shall document the various codes and their development activities. The contractor shall publish any formal documentation through the configuration control processes. The contractor shall maintain working documentation to supplement coding, as required to make implementation understandable to reviewers.

2.2.3 Participate in subsystem working group and CERES Science Team meetings.

The contractor task participants shall attend local (within 25 miles of Langley) meetings (without travel reimbursement) as needed for the work requirements established by the Subsystem Working Group Chairpersons. Attendance at non-local meetings will be through the specific written authorization of either the Task Monitor or the Working Group Chair.

2.2.4 Perform Configuration Management processes for the CERES Production Codes and provide configuration management of non-production codes, as appropriate.

As specified in the CERES Configuration Management Plan and the CERES Data Management Plan, the contractor shall follow the requirements contained therein. The contractor shall proactively identify and recommend to the CERES Data Management Team Lead, such improvements to the processes and practices that will permit the delivery process to be more efficient (i.e., use less computer or personnel resources) and quicker in turnaround time without risking integrity and producibility of the codes delivered to the ASDC.

2.2.5 Define requirements for and monitor data stored in the CERES Science Computing Facility (SCF).

The efficient use of assigned storage capacity is important due to the volumes of data used and created in the SCF. Each working group is allocated dedicated space for their use. The contractor shall work with the CERES SCF Storage Tsar, to store CERES data products, both public and non-public, in a single location to avoid duplication of files; working groups shall identify their needs to the Storage Tsar, who will accommodate them within the space available.

2.2.6 The contractor shall maintain the appropriate libraries and toolkits required to support the FM-5 instrument on NPP.

2.3 Performance Standards

2.3.1 Performance Standards for Technical and Scientific support are as follows:

- Instrument on-orbit operations are successfully monitored and actions implemented to maintain instrument health and data gathering capability
- Instrument calibrations are to the required CERES accuracy standards
- Algorithm approaches are demonstrated and documented within agreed upon schedules
- Demonstrate that algorithms have been implemented properly within agreed upon schedules (schedules designated in monthly reports when appropriate)
- Designated operational algorithms, once developed, are maintained under proper configuration management procedures and can be reproduced (if lost) within an agreed to timeframe (timeframe designated in monthly reports when appropriate)
- Analysis and interpretations of science data are documented and/or presented within agreed upon schedules

(schedules provided in monthly reports as needed)

- Websites/databases/archives are updated within an agreed to timeframe (schedules provided in monthly reports as needed)

2.3.2 Performance Standards for Data Management activities are as follows:

- Demonstrate that algorithms have been implemented properly within agreed upon schedules (schedules designated in monthly reports when appropriate)
- Designated operational algorithms, once developed, are maintained under proper configuration management procedures and can be reproduced (if lost) within an agreed to timeframe (timeframe designated in monthly reports when appropriate)
- Websites/databases/archives are updated within an agreed to timeframe (schedules provided in monthly reports as needed)
- Required documents delivered within agreed to schedules (schedules designated in monthly reports when appropriate)
- Representation by each subsystem data management team at the Bi-weekly CERES DMT meeting

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

3.2.1 Interaction with CERES Working Group Teams

Members of the CERES Data Management Team (DMT) support the CERES Instrument Working Groups and provide data management support in response to work requirements defined by these groups on an ongoing basis, while reporting activities to the DMT Lead.

3.2.3 CERES Storage Tsar

The Storage Tsar is responsible for allocating disk storage as appropriate, based on the CERES PI's priorities and the availability of disk space. The Tsar is responsible for projecting ahead the need for storage capacity and acquiring it as funding permits. The contractor shall provide recommendations as to future needs and requests for storage for working groups and teams and shall follow the allocations provided.

4.0 Schedule/Milestones/Period of Performance

November 1, 2008 to October 31, 2009

Data Management Team Biweekly Meetings: 10am on alternating Wednesdays.

5.0 Deliverables/Reporting Requirements

5.1 Technical/Scientific

Mission/instrument status reports provided to the instrument working group lead by the end of each month.

Monthly calibration status reports provided to the instrument working group lead by the end of each month.

Standard CERES data products for each subsystem as defined in on-line CERES documentation

Data retrieval and analysis algorithms as established by working group leads and the TM

Code and supporting documentation as established by working group leads.

Publications and presentations as appropriate to report results.

As appropriate, the above items shall be delivered electronically via email to the TM or designated representative.

5.2 Data Management

Informal Monthly Status Report via e-mail within 5 days of the end of the month
Code and Supporting Documentation as requested by the TM.
Publications and papers as appropriate.
Participation in CERES Bi-weekly DMT Meetings

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-044_mod0 CY 3

Task Order Title: Lidar Opto-Mechanical-Thermal-Pressure/Packaging

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

This task supports NASA LaRC's unmanned aerial vehicle (UAV) airborne Global Ozone Lidar Demonstrator (GOLD) remote sensing program. Specific support includes the design and development of hardware; including mechanical systems, opto-mechanical systems, thermal systems, and pressure/packaging systems (MOTP).

The contractor shall work with the LaRC GOLD team to define requirements and develop a compact and robust MOTP system capable of being integrated on a UAV platform, to be determined by the LaRC GOLD team. The MOTP design shall fully accommodate the GOLD lidar transceiver system requirements and UAV integration design requirements.

The contractor shall provide the technical staff and work processes to accomplish the requirements specified in the Task Order. Responsiveness shall be an important metric for task performance. The contractor shall inform the government of all activities, such as work successes, problems, and potential problems, as soon as they are known. The contractor shall respond rapidly and effectively to the customer's dynamic, unanticipated, and emergency work requirements by restructuring priorities. The format of technical progress reports (see 5.0, Deliverables) shall be established with the TM to provide maximum value and communication.

These reports shall be used to confirm priorities and current schedule constraints continually, and to communicate the work areas planned for the coming month. Metrics for delivery schedules shall be established and evolved through the planning mechanism of the technical progress reports.

All work specified by the Task Order shall be performed under the following structure.

The contractor shall follow its rigorous ISO, safety, and IT security standards. General quality standards are presented in the STARSS Quality Plan. Specific task quality requirements are established with the TM on a continual basis during the performance of the task.

Performance is monitored through periodic reviews with the TM and through formal semiannual surveys.

Performance standards include:

- Design and development of MOTP system is documented and delivered within schedules agreed to between the NASA Technical Monitor (TM) and the contractor.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

The GOLD systems may include export controlled technology. All task staff will receive appropriate instructions

regarding the requirements and provisions of SSAI's Technology Control Plan. No foreign nationals are used on this task.

Travel is supported under this task. The exact locations, durations, and timings of travel will evolve over the course of the year. As a rough estimate, staff will provide support for approximately 2 Full Time Equivalent weeks of travel in order to support GOLD team meetings, presentations and system integration issues that may occur.

4.0 Schedule/Milestones/Period of Performance

Task milestones and schedule will be established by the TM and agreed to by SSAI in monthly planning and coordination meetings.

Period of Performance is 11/1/2008 through 10/31/2009

5.0 Deliverables/Reporting Requirements

The contractor shall provide quarterly progress reports of the task status of accomplishments electronically to the NASA TM. The status of ongoing tasks, results, and issues shall be reported to the TM through informal oral status meetings. The contractor shall deliver the following to the TM at agreed-upon intervals and in specified formats:

- Mechanical and opto-mechanical designs
- Thermal system designs
- Pressure/packaging system designs
- Delivery of MOTP systems or subsystems
- Present designs at technical meetings

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-045_mod1 CY 3

Task Order Title: Instrument Integration Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

2.1 The contractor shall develop detailed estimates, plans, designs, and hardware for integrating research instruments and support equipment for NASA aircraft platforms. Tasks shall variously include development of cost and schedule estimates; conceptual through final designs; supporting analyses and documentation; FAA-DER certification of designs; and fabrication of required hardware. The contractor shall collaborate with LaRC during integration activities to provide real-time support for problems and exigencies.

The contractor shall fabricate two duplicate rear racks for the UC-12 aircraft. Rear racks should be fabricated in accordance with drawing ACCLAIM-04-X, "Assembly, Rear Rack." FAA form 8110-3 certification has been previously provided for this hardware and is not required for this task.

2.2 Performance Standards:

The contractor performance shall be evaluated on:

- The completion of designs and hardware are accomplished by schedules agreed upon by the NASA Technical Monitor and contractor
- Analysis and DER certification are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor
- Required drawings, documents, and reports are received within time period requested by NASA Technical Monitor
- Data bases, web sites, and graphical products are created within time period requested by NASA Technical Monitor

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

The contractor shall, at times, be required to interface with other commercial entities. The use of non-disclosure agreements and the proper protection of proprietary data shall be required.

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009

5.0 Deliverables/Reporting Requirements

- Weekly status telecons with the Technical Monitor (TM)
- Monthly reports (electronic format) on accomplishments, plans, progress, and issues delivered to the Technical Monitor (TM) by the end of each month.
- Monthly financial reports (electronic format) to the Technical Monitor (TM) by the end of each month. The financial

reports shall provide separate financial information if there is sub-contract involved in the report, or if there are multiple instrument integration activities occurring simultaneously.

- Design drawings, analyses, and reports delivered within 2 weeks of completing the work
- Completed hardware delivered in compliance with the agreed upon schedule
- Publications, presentations, and participation in reviews as appropriate to document and present results.

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-047_mod0 CY 3

Task Order Title: Science Directorate Information Technology Security

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall support all facets of Information Technology Security (ITS) within the Science Directorate under the overall direction of the SD IT Security Manager. The contractor shall have experience in implementing IT Security policies in a complex Information Technology environment and knowledge of NPR 2810.1 and the documents referenced within including the NIST 800 series documents. The contractor shall provide leadership in efforts to provide Certification and Accreditation (C&A) to Science Directorate systems under the overall direction established by the SD IT Security Manager.

The contractor shall work closely with the Computer Security Officers (CSOs), System Owners (SOs), and System Administrators in the Science Directorate. The contractor shall attend all appropriate meetings and convey all relevant information to appropriate CSOs and SOs. Under the guidance of the appropriate CSOs and SOs, the contractor shall apply requirements of NPR 2810.1 to Science Directorate systems deemed appropriate by the identified system level. The contractor shall work with the appropriate system administrators to implement controls as necessary. The contractor shall monitor controls to ensure continuing compliance. The contractor shall collect metrics and artifacts related to ITS within the Science Directorate with the intent to prove compliance and identify opportunities for process improvement.

Performance Standards

The contractor performance shall be evaluated on:

- Actions are taken within established time frames to ensure Science Directorate compliance with Center IT Security directives.
- IT Security documentation is developed and maintained to prove compliance with policies and requirements.
- Certification and Accreditation (C&A) of Science Directorate systems is achieved and maintained.
- Actions are taken to gain awareness of new IT Security policies and issues in a time frame to ensure that compliance can be achieved.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of performance is November 1, 2008 through October 31, 2009

The schedule and milestones will be provided to the Contractor by the NASA Technical Monitor as required.

5.0 Deliverables/Reporting Requirements

Contractor shall provide a written progress report of status and accomplishments on a semi-annual time basis electronically to the NASA Technical Monitor

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-048_mod0 CY 3

Task Order Title: NAIRAS (Nowcast of Atmospheric Ionizing Radiation for Aviation Safety) Development of Architecture

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall develop architecture for a distributed network that will enable the Nowcast of Atmospheric Ionizing Radiation for Aviation Safety (NAIRAS) model and data integration for real-time operational use. The architecture will be designed to accommodate model output and data streams from geographically dispersed institutions.

At or before the end of the contract, the contractor shall provide an end-to-end real-time prototype demonstration (TRL 8) of the NAIRAS operational system. The features of this network and the components will include:

1. server: processes all requests (input data collection/storage, model input servicing/output storage, offload aged data to archive, and user request servicing);
2. two databases (operational and archival): operations are defined as recent past, current epoch, and near term forecast; archival data are older than recent past;
3. gateway: provides rapid, consistent, quality data for all users by buffering user requests, discriminating priorities, and validating requests;
4. two data streams (input): redundant and 1-way;
5. ensemble of models: on operational machines separate from the server either at SET or other team institutions (data flow can be redundant and is 2-way); and
6. end-users: automated servers (Tier 1 priority requires a machine-to-machine interface) and manual browsers or Google Earth (Tier 2 priority come and go freely but are at a lower priority will be quicklook pages, graphics, alerts, reports, documentation) can access the operational or archival data through the gateway.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of performance is 11/1/2008 through 10/31/2009.

In conjunction with PI advice, the contractor shall establish the I/O requirements and data definitions for all the model components, the measurement data, the web interfaces, and user-database access in the distributed network concept. The major observation-based input and boundary value component integrations are: (1)

NCAR/NCEP Reanalysis pressure and geopotential height input, in conjunction with the NRLMSIS-00 atmospheric model, to calculate atmospheric depth (g/cm²); (2) neutron monitor data input (n) to calculate galactic cosmic ray (GCR) differential number flux spectrum (DNFS); (3) NOAA/GOES proton and alpha ion data input (p, $f\tilde{n}$) to calculate light ion solar energetic particle (SEP) DNFS; (3) NASA/ACE solar wind pressure (psw), interplanetary magnetic field (IMF) (B), and Dst-index input to calculate geomagnetic cutoff rigidities. The output from these models will be used to validate the interface to the AIR and HZETRN models. Each team member will be requested to help the contractor define the requirements/data for his/her respective area of contribution.

The contractor shall also begin prototype integration of some data streams and models. At this point, the radiation dose calculations are limited to background conditions to give the team a feel for the input and output data.

SET will finish development of each model and data set interface to the server and database and will complete implementation of the core capability to manage incoming and outgoing data using a central server. By the end of year 2, we will demonstrate an example of an SEP event using measurement input data from a previous solar storm event. As this stage in the NAIRAS integration, the user will be able to see the global effect of a SEP event on atmospheric radiation exposure levels. An evaluation by appropriate team members will be required to determine the feasibility of replacing the semi-empirical geomagnetic cutoff rigidity model with more rigorous models for real-time calculations of the cutoff rigidities. The above components listed in year 1 will be tested using historical data for both background GCR and SEP conditions. The historical data will be chosen to maximize the availability of independent ground-based, atmospheric, and space-based observations to aid in the component verification and validation.

5.0 Deliverables/Reporting Requirements

The primary deliverable is a data-driven prototype operational system for a global nowcast of atmospheric ionizing radiation dose rates computed from the surface of the Earth to approximately 95 km with an update of the global radiation dose rates at least every 3 hours. An automated server access capability and a manual web-interface to the dose rate database will be provided to enable flight path information to be entered in order to calculate radiation exposure levels over the duration of a commercial airline flight. The operational database will also maintain a running total of accumulated dose for a “phantom” pilot for a suite of representative flight paths (e.g., New York to London, Chicago to Hong Kong, etc.), based on realistic aircrew flight schedules. This feature can be accessed via a browser to provide a “quick-look” assessment of hourly-to-yearly radiation exposure levels for representative flight paths, but including realistic background GCR and SEP conditions during the period of interest. By the end of year 1, there will be a prototype system that integrates the GCR model with the parametric AIR model for the radiation dose calculations.

A secondary deliverable shall be monthly progress reports and refereed journal publications documenting the performance and improvements achieved by the NAIRAS concept.

A tertiary deliverable shall be presentations of the operational system at the annual Space Weather Week Workshop in Boulder, CO.

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-049_mod0 CY 3

Task Order Title: NAIRAS (Nowcast of Atmospheric Ionizing Radiation for Aviation Safety)
Magnetic Field and Diagnostic Output

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide magnetospheric magnetic field and diagnostic output from Lyon-Fedder-Mobarry (LFM) MHD simulations of magnetospheric dynamics, combined with the coupled magnetosphere-ionosphere-thermosphere (CMIT) model. LFM/CMIT model simulations will be run for specified quiet-time and solar energetic particle (SEP) events in order to benchmark and improve the real-time, flight-path-specific and global semi-empirical geomagnetic cutoff rigidity components of the NAIRAS (Nowcast of Atmospheric Ionizing Radiation for Aviation Safety) model. The primary output from LFM/CMIT model needed for this activity is the time-dependent magnetospheric magnetic field. NCAR/HAO will provide Dartmouth College the LFM/CMIT magnetic field output for simulations of geomagnetic cutoff rigidity. Diagnostic output will be provided to the team for guidance in the development of the real-time geomagnetic cutoff rigidity model(s).

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of performance is 11/1/2008 through 10/31/2009.

In conjunction with collaborative interactions with Dartmouth College and project team consensus, the contractor shall assist in developing the I/O requirements and data definitions for the real-time, flight-path-specific geomagnetic cutoff rigidity models. The contractor shall collaborate with Dartmouth College to develop an interface between the LFM/CMIT magnetospheric magnetic field model output and the Lorentz-trajectory model simulations of geomagnetic cutoff rigidity provided by Dartmouth College. The contractor shall run quiet-time LFM/CMIT simulations of the magnetospheric magnetic field prior to the SEP events specified below. The magnetic field output will be provided to Dartmouth College for geomagnetic cutoff rigidity calculations.

The contractor will provide LFM/CMIT simulations of the time-dependent magnetospheric magnetic fields for the following historical SEP events: (1) September-October 1998, (2) October-November 2003, (3) January 2005, and (4) December 2006. The contractor will provide the magnetic field output to Dartmouth College for geomagnetic cutoff rigidity calculations. The contractor will provide consultation on the assessment of the validity of the NAIRAS flight-path-specific and global semi-empirical geomagnetic cutoff rigidity models, and will provide guidance for further development.

5.0 Deliverables/Reporting Requirements

The first deliverable shall be ascii output files and corresponding plots of global distributions of magnetospheric magnetic fields from the LFM/CMIT simulations for the quiet-time periods prior to the following SEP events: (1) September-October 1998, (2) October-November 2003, (3) January 2005, and (4) December 2006.

The second deliverable will be ascii output files and corresponding plots of global distributions of time-dependent magnetospheric magnetic fields from LFM/CMIT simulations for the following SEP events: (1) September-October 1998, (2) October-November 2003, (3) January 2005, and (4) December 2006. The magnetic fields will be provided at 1-hour intervals throughout the duration of the above SEP events.

A third deliverable shall be monthly progress reports and refereed journal publications documenting the progress and development of the real-time geomagnetic cutoff rigidity component of the prototype operational NAIRAS model.

A fourth deliverable shall be presentations of the NAIRAS geomagnetic cutoff rigidity model given at the annual Space Weather Week Workshop in Boulder, CO.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-050_mod0 CY 3

Task Order Title: NAIRAS (Nowcast of Atmospheric Ionizing Radiation for Aviation Safety) Geomagnetic Cutoff Rigidities

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide geomagnetic cutoff rigidities for specified quiet-time and solar energetic particle (SEP) events in order to benchmark, validate, and improve the real-time, semi-empirical geomagnetic cutoff rigidity component of the NAIRAS (Nowcast of Atmospheric Ionizing Radiation for Aviation Safety) model. The cutoff rigidities will be based on Lorentz-trajectory simulations using time-dependent magnetospheric magnetic fields generated by (1) the empirical T05 model [Tyganenko, 2005] and (2) by the LFM/CMIT model (i.e., Lyon-Fedder-Mobarry (LFM) MHD simulation of magnetospheric dynamics combined with the coupled magnetosphere-ionosphere-thermosphere (CMIT) model). The magnetic fields generated by the T05 model, which are input to the geomagnetic cutoff rigidity computations, will be provided by the contractor. The magnetic fields generated by LFM/CMIT will be provided by NCAR High Altitude Observatory (HAO). The Lorentz-trajectory geomagnetic cutoff rigidity code, based on the T05 magnetospheric magnetic field model, will be interfaced with NAIRAS distributed network system for storm-time, flight-path-specific radiation dose calculations.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of performance is 11/1/2008 through 10/31/2009.

In conjunction with collaborative interactions with NCAR/HAO and project team consensus, the contractor shall establish the I/O requirements and data definitions for the real-time, flight-path-specific geomagnetic cutoff rigidity calculations. The contractor shall also collaborate with Space Environment Technologies, Inc. in developing the flight-path-specific geomagnetic cutoff rigidity model software interface to the NAIRAS distributed network system. The contractor shall collaborate with NCAR/HAO and develop the interface between the LFM/CMIT magnetospheric magnetic field model output and the Lorentz-trajectory model simulations of geomagnetic cutoff rigidity. Quiet-time cutoff rigidities will be provided prior to the SEP events specified below.

The contractor will provide simulations of geomagnetic cutoff rigidities for the following historical SEP events: (1) September-October 1998, (2) October-November 2003, (3) January 2005, and (4) December 2006. The Lorentz-trajectory geomagnetic cutoff rigidity calculations will be done using time-dependent magnetospheric magnetic fields computed from the T05 and LFM/CMIT models. The LFM/CMIT magnetic field output will be provided by NCAR/HAO. The contractor will provide consultation on the assessment of the validity of the NAIRAS flight-path-specific and global semi-empirical geomagnetic cutoff rigidity models, and will provide guidance for further development.

5.0 Deliverables/Reporting Requirements

The first deliverable shall be ascii output files and corresponding plots of global distributions of geomagnetic cutoff rigidities for the quiet-time periods prior to the following SEP events: (1) September-October 1998, (2) October-November 2003, (3) January 2005, and (4) December 2006. The cutoff rigidities will be computed using magnetospheric magnetic fields simulated by the T05 and LFM/CMIT models.

The second deliverable will be ascii output files and corresponding plots of global distributions of geomagnetic cutoff rigidities for the following SEP events: (1) September-October 1998, (2) October-November 2003, (3) January 2005, and (4) December 2006. The cutoff rigidities will be computed using magnetospheric magnetic fields computed by the T05 and LFM/CMIT models. The two sets of cutoff rigidities will be provided at 1-hour intervals throughout the duration of the above SEP events.

A third deliverable shall be monthly progress reports and refereed journal publications documenting the development of the real-time geomagnetic cutoff rigidity component of the prototype operational NAIRAS model.

A fourth deliverable shall be presentations of the NAIRAS geomagnetic cutoff rigidity model given at the annual Space Weather Week Workshop in Boulder, CO.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-051_mod1 CY 3

Task Order Title: FIRST/FORGE Deployment

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

Description of Work

The contractor shall:

Provide critical support in the deployment of the Far-Infrared Spectroscopy of the Troposphere (FIRST) instrument to Chile in support of the Far-Infrared Observations of the Radiative Greenhouse Effect (FORGE) campaign. The FORGE campaign is scheduled to occur between August and October, 2009. In addition there will be a campaign “dry-run” to be held at the Atmospheric Radiation Measurement (ARM) program Southern Great Plains (SGP) observatory from April 1, 2009 through May 15, 2009. NASA also plans to operate the instrument at Langley from late 2008 until April 2009 in preparation for the deployment to SGP and Chile.

Provide technical and logistical support to deploy the FIRST instrument to the SGP site (nominal ship date from Langley is March 15 2009) and to ensure safe shipment of the FIRST instrument from the SGP to the site in Chile. This includes housing for the FIRST instrument to enable operation at the SGP and Chile sites. (The ARM program is responsible for shipment of FIRST from SGP to Chile, and back to Langley from Chile).

Operate, with NASA, the instrument at Langley and both the SGP and Chile sites.

Secure recorded data on appropriate media for return to Langley for scientific analyses.

Arrange for analysis of the data with external science team members.

Performance Standards

The contractor performance shall be evaluated on:

- Implementing new memory cards and storage devices in FIRST to ensure continuous operation at high altitude/low pressure of Chile environment, as directed and agreed upon by the NASA Technical Monitor and the contractor
- Successful and safe operation of the instrument at Langley, SGP, and Chile locations
- Storage and return of all FIRST data to Langley for evaluation

The contractor shall provide additional field operations support for the deployment of the FIRST instrument to both Colorado and Chile. This support shall require the services of four individuals for approximately 1 week in Colorado in the late April 2009 timeframe. The same team shall provide similar support in Chile starting early August 2009 through approximately mid October 2009.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of performance is November 1, 2008 through October 31, 2009.

The FIRST instrument is scheduled to be ready for operation in “campaign mode” on 10/31/2008. It is anticipated that a four month checkout (November 2008 through February 2009) shall be required during which the instrument will be tested and operated as if it were participating in the dry run and the campaign. It is expected that the instrument and its operating environment (trailer/container) shall be completely established by October 31, 2008.

The instrument shall be operated at Langley from 11/2008 through 3/2009 as part of training the deployment team in instrument operations.

Data recording devices and modifications to instrument computer systems, to enable operation at altitude, shall be completed by 12/31/2008.

5.0 Deliverables/Reporting Requirements

The contractor shall provide monthly written reports to the NASA Technical Monitor

The contractor shall meet with NASA FORGE Team members as needed, to discuss project requirements.

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-053_mod0 CY 3

Task Order Title: Advanced Algorithms and Computing Methods

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

This effort shall support two individual studies.

The contractor shall support study one as follows:

1. Upgrade the SeaDAS Software program to include an improved treatment of sunlight including multiple scattering in the atmosphere, and surface wave slope distributions consistent CALIPSO measurements.
2. Application of this upgrade to SeaWiFS/MODIS data.
3. Combined SeaWiFS/MODIS and Calipso retrievals.
4. Explore the potential for using controlled wave tank experiments to improve description of air-sea interactions with applications to the remote sensing of the carbon budget from space.

This study requires expertise in retrieving wind information from backscattered laser energy. The CALIPSO wind retrieval also requires the estimation of aerosol extinction between the satellite and the ocean surface.

The contractor shall support study two as follows:

1. Develop algorithms for radiative transfer equation to be implemented on computers with general purpose graphic processing units (GPGPU).
2. Develop the lattice Boltzmann algorithms for hydrodynamics to be implemented on GPGPU computers.
3. Study the parallelization of the aforementioned algorithms within GPGPUs and on clusters of GPGPUs.
4. Providing consultation to NASA scientists on algorithm development and implementation on GPGPU computing.

This study requires expertise in algorithm development and implementation on computers with both central processing units (CPU) and graphic processing units (GPU). The intent of this study is to significantly enhance the performance of the radiative transfer code by using GPGPU computing.

Performance standards are as follows:

1. Software program upgraded based upon schedule agreed to by NASA TM and contractor
2. GPGPU algorithms developed based upon schedule agreed to by NASA TM and contractor

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of performance is November 1, 2008 to October 31, 2009

5.0 Deliverables/Reporting Requirements

All deliverables are received based upon schedule agreed to by the NASA TM and the contractor

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-054_mod0 CY 3

Task Order Title: Studies in the Upper Troposphere and Lower Stratosphere

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

A. The contractor shall perform studies of the UTLS region including the following:

A1. Validation of GMI combo model in the UTLS region:

Use water vapor data from SAGE II version 6.2 as well as Canadian ACE mission to characterize the hygropause globally and study its relation vis-à-vis the tropopause. These results will be used to evaluate the simulations by the GMI combo model. Further, satellite and ozonesonde data in the extratropics will be used to assess the feasibility of using the GMI model for studying ozone laminae or thicker layers.

A2. Impacts of biomass burning on the UTLS:

Use CO data from MOPITT, MLS and the Canadian mission ACE, along with ozone data from MLS, TES and OMI, and CALIPSO aerosol product to study the changes in the UTLS region resulting from the biomass burning fires in the Tropics. Fires in the extratropics will be studied in the context of pyroconvection using MLS and ACE data on the trace species along with aerosol measurements by CALIPSO. Once again the analysis will be complemented by results from CTMs.

B. The contractor shall perform studies pertaining to the use of CALIPSO and TOR data to study Air Quality including the following:

B1. Characterization of air quality around large urban areas:

Use tropospheric column NO₂ data from SCIAMACHY/OMI and CO data from MOPITT, along with aerosol data from Terra and tropospheric column ozone (TCO) from OMI/MLS to isolate possible pollutant plumes around large cities and urban areas and study their seasonal and interannual variations. A chemical transport model like GEOS-Chem or GMI combo model will be employed to delineate the effects of transport. The utility of aerosol data from CALIPSO in such studies will be assessed.

B2. Assessment of SBUV/TOR data for air quality studies:

Use lower tropospheric CO data from MOPITT, total column CO data from SCIAMACHY (with better sensitivity to boundary layer pollution) and Tropospheric ozone residual (TOR) data from TOMS/SBUV to study their correlation over various areas of the globe for the years 2000-2005. In combination with simulations from the GMI combo model, these correlations will be used to assess the utility of the TOR data for air quality studies.

The contractor performance shall be rated on the following:

1. Analysis and interpretation of science data are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor.
2. Required documents are received within time period requested by NASA Technical Monitor

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):
N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009

Schedule and Milestones: see section 5.0

5.0 Deliverables/Reporting Requirements

The contractor shall submit quarterly reports electronically to the NASA TM to document progress in the areas listed in section 2.0. The reports will be reviewed by the Lead Scientist of the Science Directorate and used as a basis for developing additional milestones.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-056_mod0 CY 3

Task Order Title: NAST Engineering

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide engineering and technical support for the NPOESS Airborne Sounder Testbed-Interferometer (NAST-I) program; NPOESS is the National Polar-orbiting Operational Environmental Satellite System. This support shall focus on activities to maintain, optimize, and improve instrument hardware performance, while including advancements to instrument command and control, and data acquisition and visualization software. Areas of support in this area include, but are not limited to: dynamic alignment, blackbody, and overall instrument controllers; and data acquisition and display software modules. The contractor shall also support checkout flights of NAST-I to be conducted after system enhancements by analyzing and interpreting near-real-time NAST-I instrument flight science and engineering data.

Performance Standards:

- Supports improvements to and optimization of the NAST-I sensor performance, instrument control, and data acquisition and display software.
 - Participates in meetings, mostly via telecon, presenting status and results, on schedules agreed upon between the contractor and the Task Monitor (TM).
 - Updates technical documentation corresponding to h/w and s/w optimization and improvement activities.
 - Supports instrument inter-calibration activities.
 - Supports field checkout flight per NAST requirements and schedules agreed upon between the contractor and the TM.
-

3.0 Special Requirements

Access to Sensitive or ITAR Data: Yes

Other (Specify):

Familiarity with advanced atmospheric sounder systems; thorough working knowledge and experience with Fourier Transform Spectrometer (FTS) systems, with specific and extensive background in high spectral resolution infrared systems. An applications engineer that has experience in the field of optical remote sensing, especially in the infrared domain. Ten years or more experience maintaining, calibrating, and improving Fourier Transform Spectrometers is expected, with particular emphasis in the area of performance optimization for high-altitude aircraft environment implementations.

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009

Key reviews/milestones will likely include participation in the following:

- SRR - System Requirement Review & Kick off meeting—in person @ LaRC
- PDR - Preliminary Design Review—via telecon
- CDR - Critical Design Review—in person @ LaRC
- TRR - Test Readiness review (optional if included in CDR) –Telecon(s)
- Pre acceptance –telecon(s) (presentation of lab data)
- Delivery, installation and final acceptance—in person @ LaRC
- Post-refurb system verification (calibration & uplooking tests)—in person @ LaRC
- Checkout flights, if conducted, in Houston

5.0 Deliverables/Reporting Requirements

- Quarterly report to the TM via email or other electronic media covering accomplishments, issues, and plans.
- Engineering and technical results shall be reported to the TM and other team members as needed in an agreed upon format.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-057_mod0 CY 3

Task Order Title: Lidar Opto-Mechanical Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

This task supports NASA LaRC's airborne High Spectral Resolution Lidar (HSRL) remote sensing program. Specific support includes mechanical, opto-mechanical, thermal, and electro-optical systems design and development.

On an as-needed basis and in response to new instrument configuration requirements, the contractor shall modify or redesign and manufacture fixtures for mounting the existing Airborne HSRL instrument in the LaRC UC-12 and B200 aircraft.

The contractor shall develop the opto-mechanical design and components for the HSRL-Ozone DIAL lidar being developed by the LaRC HSRL team.

The contractor shall also develop designs and components for hardening the HSRL-Ozone system to fly in the NASA ER-2, including the design, development, and certification of a pressure housing to contain the instrument and fixtures for mounting the instrument in the ER-2.

The contractor shall design, develop, and certify fixtures to mount the HSRL-Ozone DIAL instrument in the LaRC UC-12 and B200 aircraft.

The contractor shall provide the technical staff and work processes to accomplish the requirements specified in the Task Order. Responsiveness shall be an important metric for task performance. The contractor shall keep the government informed of all activities, such as work successes, problems, and potential problems, as soon as they are known. The contractor shall respond rapidly and effectively to the customer's dynamic, unanticipated, and emergency work requirements by restructuring priorities. The format of technical progress reports (see 5.0, Deliverables) shall be established with the TM to provide maximum value and communication.

These reports shall be used to confirm priorities and current schedule constraints continually, and to communicate the work areas of the WBS planned for the coming month. Metrics for delivery schedules shall be established and evolved through the planning mechanism of the technical progress reports.

All work specified by the Task Order shall be performed under the following structure.

2.1 Work Breakdown Structure

110 Mechanical, opto-mechanical, thermal, and electro-optical systems design and development
120 Aircraft certification of airborne instruments.

2.2 Quality and Performance Standards

The contractor shall follow its rigorous ISO, safety, and IT security standards. General quality standards are presented in the STARSS Quality Plan. Specific task quality requirements are established with the TM on a continual basis during the performance of the task.

Performance is monitored through periodic reviews with the TM and through formal semiannual surveys.

3.0 Special Requirements

Access to Sensitive or ITAR Data: Yes

Other (Specify):

The lidar systems include export controlled technology. Export control is addressed in Section 9.3 of this task plan. No foreign nationals are used on this task.

4.0 Schedule/Milestones/Period of Performance

Task milestones and schedule will be established by the TM and agreed to by the contractor in monthly planning and coordination meetings.

Period of Performance is November 1, 2008 through October 31, 2009

5.0 Deliverables/Reporting Requirements

The contractor shall provide quarterly progress reports of the task status of accomplishments electronically to the NASA TM. The status of ongoing tasks, results, and issues shall be reported to the TM through informal oral status meetings. The contractor shall deliver the following to the TM at agreed-upon intervals and in specified formats:

- Final design and delivery opto-mechanical assemblies for the HSRL-Ozone DIAL instrument
- Final design and delivery of fixtures for mounting the HSRL-Ozone DIAL instrument in the ER-2
- Documentation of certification for the HSRL-Ozone DIAL instrument on the ER-2
- Final design and delivery of fixtures for mounting the HSRL-Ozone DIAL instrument in the LaRC B200 and UC-12

Documentation of certification for the HSRL-Ozone DIAL instrument on the LaRC B200 and UC-12

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-058_mod0 CY 3

Task Order Title: Lidar Optical Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

This task supports NASA LaRC's airborne High Spectral Resolution Lidar (HSRL) remote sensing program. Specific support tasks include design and development of a prototype interferometers and etalons for use in an HSRL receiver...

The contractor shall work with the LaRC HSRL team to finalize the designs of HSRL receiver interferometers to discriminate aerosol and molecular backscatter at 355 nm, 532 nm, and 1064 nm. Fabricate and test the interferometers and deliver the interferometers to NASA LaRC for evaluation of performance in a lidar receiver. The contractor shall also work with the HSRL team to analyze performance tests conducted in the laboratory and in the lidar system.

The contractor shall work with the LaRC HSRL team to design and develop narrowband etalons at 355 and 532 nm for solar rejection in the HSRL-Ozone DIAL receiver.

The contractor shall provide the technical staff and work processes to accomplish the requirements specified in the Task Order. Responsiveness shall be an important metric for task performance. The contractor shall keep the government informed of all activities, such as work successes, problems, and potential problems, as soon as they are known. The contractor shall respond rapidly and effectively to the customer's dynamic, unanticipated, and emergency work requirements by restructuring priorities. The format of technical progress reports (see 5.0, Deliverables) shall be established with the TM to provide maximum value and communication.

These reports shall be used to confirm priorities and current schedule constraints continually, and to communicate the work areas of the WBS planned for the coming month. Metrics for delivery schedules shall be established and evolved through the planning mechanism of the technical progress reports.

All work specified by the Task Order shall be performed under the following structure.

2.1 Work Breakdown Structure

- 110 HSRL Interferometric Receiver
- 120 HSRL solar rejection etalons

2.2 Quality and Performance Standards

The contractor shall follow its rigorous ISO, safety, and IT security standards. General quality standards are presented in the STARSS Quality Plan. Specific task quality requirements are established with the TM on a continual basis during the performance of the task.

Performance is monitored through periodic reviews with the TM and through formal semiannual surveys.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):
N/A

4.0 Schedule/Milestones/Period of Performance

Task milestones and schedule will be established by the TM and agreed to by the contractor in monthly planning and coordination meetings.

Period of Performance is November 1, 2008 through October 31, 2009

5.0 Deliverables/Reporting Requirements

The contractor shall provide quarterly progress reports of the task status of accomplishments electronically to the NASA TM. The status of ongoing tasks, results, and issues shall be reported to the TM through informal oral status meetings. The contractor shall deliver the following to the TM at agreed-upon intervals:

- Final design and optical assemblies for interferometers designed to the HSRL technique at 355, 532, and 1064 nm
- Final design and optical assemblies for solar rejection etalons at 355 and 532 nm.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-059_mod0 CY 3

Task Order Title: Advanced Lidar Retrieval Studies

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

This task supports NASA LaRC's airborne High Spectral Resolution Lidar (HSRL) remote sensing program. Specific support tasks include consultation on aerosol retrievals using lidar data and combined retrievals using lidar data and data from passive polarimeters.

The contractor shall work with the HSRL team and designees to explore aerosol retrieval techniques and the uncertainties in the retrieved products using various combinations of extinction, backscatter, and depolarization profiles. The study shall include assessment of the most practical implementations of autonomous lidar algorithms for satellite-based lidars providing backscatter at 355, 532, and 1064 nm and extinction at 355 and 532 nm.

The contractor shall work with the HSRL team and designees to explore combined lidar-polarimeter aerosol retrieval techniques (i.e., retrievals using a combination of lidar and polarimeter data). The study shall include assessment of the most practical implementations of autonomous lidar algorithms for satellite-based sensors.

The contractor shall provide the technical staff and work processes to accomplish the requirements specified in the Task Order. Responsiveness shall be an important metric for task performance. The contractor shall keep the government informed of all activities, such as work successes, problems, and potential problems, as soon as they are known. The contractor shall respond rapidly and effectively to the customer's dynamic, unanticipated, and emergency work requirements by restructuring priorities. The format of technical progress reports (see 5.0, Deliverables) shall be established with the TM to provide maximum value and communication.

These reports shall be used to confirm priorities and current schedule constraints continually, and to communicate the work areas of the WBS planned for the coming month. Metrics for delivery schedules shall be established and evolved through the planning mechanism of the technical progress reports. All work specified by the Task Order shall be performed under the following structure.

2.1 Work Breakdown Structure

- 110 Develop retrieval study objectives and work plan
- 120 Lidar retrieval studies

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Task milestones and schedule will be established by the TM and agreed to by the contractor in monthly planning and coordination meetings.

Period of Performance is Award through October 31, 2009

5.0 Deliverables/Reporting Requirements

The contractor shall provide quarterly progress reports of the task status of accomplishments electronically to the NASA TM. The status of ongoing tasks, results, and issues shall be reported to the TM through informal oral status meetings. The contractor shall deliver the following to the TM at agreed-upon intervals and in specified formats:

- Report on the general architecture and expected performance of autonomous 3-beta, 2-alpha lidar aerosol retrieval algorithms for satellite HSRL data sets.
- Report on the general architecture and expected performance of autonomous combined lidar-polarimeter aerosol retrieval algorithms for satellite HSRL and polarimeter data sets.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-060_mod1 CY 3

Task Order Title: CALISPO, CloudSat, CERES and MODIS Production

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall perform support to the project funded by the NASA Energy Water cycle Study (NEWS) in three technical areas 1) clouds, 2) convolution 3) surface and atmospheric radiation budget, 4) data management support.

2.1 Technical/Science Support

The contractor shall support the effort integrating multiple satellite sets and reanalysis including CALIPSO, CloudSat, MODIS, CERES, GEOS and other data sets used in the CERES, CALIPSO and CloudSat projects. The contractor shall develop an improved passive sensor retrieval algorithm using retrieved cloud properties by active sensors such as CALIPSO and CloudSat. The contractor shall perform the integration of MODIS, CALIPSO, and CloudSat data with CERES by applying its point spread function. The contractor shall coordinate with the CERES instrument group and apply up-to-date instrument calibration coefficients. The contractor shall apply CERES angular distribution models to compute top-of-atmosphere radiative fluxes. The contractor shall perform the computation of radiative flux profiles with CALIPSO, CloudSat and MODIS retrieved cloud and aerosol profiles. The contractor shall analyze cloud and aerosol effects on radiation. The contractor shall perform the validation of the data product. The validation effort includes the visualization of the data and comparisons of the merged data product with CALIPSO and CloudSat data. The contractor shall summarize work/analyses in memos, reports, meeting proceedings, or peer-reviewed scientific journals.

2.2 Data management support

The contractor shall produce CALIPSO, CloudSat, CERES and MODIS merged data product for distribution to the community. The contractor shall revise the merged data by closely following the revision of CALIPSO, CloudSat, CERES, and MODIS data. The contractor shall work with the Langley Atmospheric Science Data Center (ASDC) to archive the merged data product for the distribution to the community.

2.2.1 Code development

The contractor shall perform the code development required for merging data, improved cloud algorithm, radiative flux profile computation, and producing data in a proper format for the distribution. The contractor shall develop and maintain tool kits required for above tasks.

Performance Standards

The contractor performance shall be evaluated on:

- Analysis and interpretation of science data are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor
- Required documents are received within time period requested by NASA Technical Monitor
- Data bases, web sites, and graphical products are created within time period requested by NASA Technical Monitor

3.0 Special Requirements

Access to Sensitive or ITAR Data: Null

Other (Specify):
N/A

4.0 Schedule/Milestones/Period of Performance

Period of performance is award through 10/31/2009.

All required items shall be delivered by the contractor to the TM within agreed upon timeframe.

5.0 Deliverables/Reporting Requirements

All items shall be delivered by the contractor to the TM within agreed upon timeframe in the specific format required.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-061_mod1 CY 3

Task Order Title: Aerosol-Cloud-Radiation Interactions

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall perform tasks to support research projects focusing on aerosol-cloud-radiation interactions. This research will involve analyses involving satellite, aircraft and surface observations together with model output meteorological fields. The analyses will support process-oriented aspects of aerosol-cloud interactions as well as analysis of multi-year satellite data records to quantify interannual variability at tropical and global spatial scales. The primary satellite data will include CERES, MODIS and CALIPSO. Also included under this task is the study of aerosol direct radiative effects and a quantitative assessment of how thin clouds as identified by CALIPSO (and missed by MODIS) influence the Earth's radiation budget.

2.3 Performance Standards

Performance Standards for Technical and Scientific support are as follows:

- Analysis and interpretations of science data are documented in peer-reviewed scientific journals and/or presented at meetings.

3.0 Special Requirements

Access to Sensitive or ITAR Data: Null

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is Award Through 10/31/2009

5.0 Deliverables/Reporting Requirements

N/A

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-062_mod1 CY 3

Task Order Title: Aerosol Impacts

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall perform tasks to support research projects concerning aerosol impacts to the radiation budget and aerosol impacts on the retrieval of the properties of both clouds and the earth's surface. One aspect involves an error analysis of CERES global products from the Aqua spacecraft with CALIPSO lidar data. A second focuses on selected locations having surface-based measurements. Specialized radiative transfer calculations incorporating surface, CERES, MODIS, and CALIPSO data will be made at these locations to diagnose direct aerosol forcing and probe for indirect effects.

Performance Standards

Performance Standards for Technical and Scientific support are as follows:

- Analysis and interpretations of science data are documented in peer-reviewed scientific journals and/or presented at meetings.

3.0 Special Requirements

Access to Sensitive or ITAR Data: Null

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of performance is award through 10/31/2009

5.0 Deliverables/Reporting Requirements

N/A

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-063_mod0 CY 3

Task Order Title: Travel Support for ARCTAS Data Workshop

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall support the NASA ARCTAS Data Workshop to be held at the Holiday Inn Sunspree in Virginia Beach from 27-30 January 2009.

The contractor will perform the following task requirements:

1. Arrange travel for non-NASA participants (approx. 70 people) to include flight reservations, lodging, rental car, and other needs.
2. Provide weekly updates on participants registered to attend the meeting.
3. Provide reimbursement for travel expenses to workshop participants upon submission of an expense report.
4. Provide a detailed account of expenses incurred by and reimbursed to workshop participants.
5. Provide payment to Holiday Inn Sunspree for meeting venue expenses up to \$20,000.

3.0 Special Requirements

Access to Sensitive or ITAR Data: Null

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

This task is to commence as soon as possible and will extend until all reimbursements have been completed. The task should be able to be completed within 30 days after the completion of the meeting. A spreadsheet will be provided giving an initial list of expected participants and locations from which they will travel for

purposes of cost estimation.

5.0 Deliverables/Reporting Requirements

1. Weekly updates (due each Friday) on participants registered to attend the meeting, any special requests, and airfare cost incurred.
2. Bi-weekly updates (due each Friday) after the meeting providing a detailed account of expenses incurred by and reimbursed to workshop participants.

Changes to reporting requirements shall be coordinated with and approved by the TM.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-064_mod0 CY 3

Task Order Title: NAIRAS Software System Interface

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide the technical staff and work processes to accomplish the requirements specified in the Task Order.

Responsiveness will be an important metric for task performance. SSAI will keep the government informed of all activities, such as work successes, problems, and potential problems, as soon as they are known. The contractor will respond rapidly and effectively to the customer's dynamic, unanticipated, and emergency work requirements by restructuring priorities.

The format of technical progress reports (see 5.0, Deliverables) will be established with the TM to provide maximum value and communication. These reports will be used to confirm priorities and current schedule constraints continually, and to communicate the work areas of the WBS planned for the coming month. Metrics for delivery schedules will be established and evolved through the planning mechanism of the technical progress reports. All work specified by the Task Order will be performed under the following structure.

2.1 Work Breakdown Structure

100 Develop software to read real-time data input to NAIRAS model

200 Convert IDL routines to Fortran: mapping NAIRAS ascii output files radiation flux and dose onto a global grid ascii output file

300 Improve perl script for interfacing NAIRAS code with input/output data

400 Develop visualization software for displaying NAIRAS output

2.2 Quality and Performance Standards

The contractor shall follow its rigorous ISO, safety, and IT security standards. General quality standards are presented in the STARSS Quality Plan. Specific task quality requirements are established with the TM on a continual basis during the performance of the task.

Performance shall be monitored through periodic reviews with the TM and through formal semiannual surveys. The Contractor shall provide a technical status report to the TM in a format and on a schedule as requested.

3.0 Special Requirements

Access to Sensitive or ITAR Data: Yes

Other (Specify):

The radiation transport component of NAIRAS -- the NASA HZETRN code -- is ITAR restricted. Foreign Nationals will only be given access to NAIRAS data interface routines, the perl script interface code, and the input/output data.

4.0 Schedule/Milestones/Period of Performance

Task period of performance is award through 10/31/2009.

10/31/2009, the data read software software, the IDL-to-Fortran NAIRAS data output to global grid software, the improved perl script interface routine, and the visualization software.

5.0 Deliverables/Reporting Requirements

Software Modules: The NAIRAS data input interface routines, the IDL-to-Fortran NAIRAS output to global map routines, the improved perl script NAIRAS interface routine.

Visualization Products: Color graphical displays of NAIRAS data products

Monthly Report: Monthly progress report.

6.0 Other information needed for performance of task

The contractor shall assign the appropriate resources to perform the requirement identified in the Task Order.

The metric for staffing will be indicated by success in staff retention, timely recruiting, and anticipating the required skill mix. Off-site support costs will be apportioned to the task to accommodate contract management, group lead management, and infrastructure administrative functions.

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-066_mod0 CY 3

Task Order Title: Digital Archival of Science Project Documentation

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide for the digitizing of historical Science Directorate project documents which may consist of standard 8 1/2 x 11 office documents, bound documents, oversize engineering drawings and so forth. These documents may include black and white type written material, color material, photos, information written in pencil, and possibly other medium. The initial effort will begin with the digitizing of CALISPO and LITE project data, however, not limited to these projects.

Due to the value and uniqueness of these collections, on-site digitization is a requirement. The scanned information should possess the following qualities: Documents should be scanned at 300dpi; the pages of the original documents should be kept in the correct order within documents and documents in order within groupings; quality control with random sampling of images for legibility shall be done by the contractor; the scanned documents should be full-text OCR and fully searchable PFD files; the effort may require standard documentation preparation in addition it may require removing documents from special bindings, some pages may require special care such as pasting with tape, insertion of separator sheets, staple removable and unfolding.

The contractor shall also provide the ability to digitize electronic documents which may be included in this collections into full-txt OCR and fully searchable PDF files. The formats of these files may include MS work, MS Excel and other formats as agreed to between the TM and the contractor.

The contractor shall ensure proper safeguarding and storage of documents during this digitizing process.

The contractor shall generate metadata in support of structured searches of digitized documents. The contractor shall work with the NASA TM and other NASA personnel to determine the optimal metadata categories and classifications.

3.0 Special Requirements

Access to Sensitive or ITAR Data: Null

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

The contractor shall deliver the digitized full-text OCR PDF images on an external hard drive that will be provided by the government on a schedule mutually agreed upon between the TM and the contractor.

Period of Performance will be from date of award through no later than 10/31/2009.

5.0 Deliverables/Reporting Requirements

The contractor shall deliver the digitized full-text OCR PDF images on an external hard drive that will be provided by the government on a schedule mutually agreed upon between the TM and the contractor.

The contractor shall return the documents in the same order and using the same packaging methods that they were provided by the government.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-067_mod0 CY 3

Task Order Title: IVHM 757 Data Transfer

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

Background:

NASA's Aviation Safety (AvSAFE) Program's Integrated Vehicle Health Management (IVHM) project is conducting a variety of research activities leading to the automated detection, diagnosis, prognostics, and mitigation of adverse events during flight as described in version 2.0 of the IVHM technical plan

("http://www.aeronautics.nasa.gov/nra_pdf/ivhm_tech_plan_c1.pdf").

NASA Langley maintains an archive of 757 flight data that would be immediately beneficial in supporting envisioned IVHM methodologies that utilize onboard flight data for estimating vehicle health state. These 757 flight archives are well documented and span multiple flights. The 757 flight archives are currently stored on Langley's Omega 3000 system and are not accessible to NASA's IVHM civil servant research team for use in health management research.

Objective:

The overall objective of this task is to make the flight test data currently archived in Langley's B-757 Data Acquisition System (DAS) available to the IVHM civil servant research team. This data is stored in an unprocessed format at Langley's Aerospace Data Acquisition and Processing Station (ADAPS).

Task Description:

The contractor shall provide for the transferring of raw data files (in a secure, encrypted form) from Langley's 757 DAS, comprised of approximately 35 archived research flights in the Omega 3000 native format. The contractor shall provide the project files associated with each flight, any source code required to process the raw data files, provide flight notes and the associated Measurement list (if applicable) with each flight. The contractor shall transfer all the associated files and data for each individual flight project, as it is accumulated. This method of transfer will be flight project to flight project until all the above archived research flights are completed.

Performance Standards:

All project files, source code, flight notes and measurement lists are provided in the format and by the dates agreed to between the Contractor and NASA TM

3.0 Special Requirements

Access to Sensitive or ITAR Data: Null

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of performance is award through 10/31/2009

5.0 Deliverables/Reporting Requirements

- Flight data in the Omega 3000 native format
- Project files associated with each flight
- All software developed at Langley required to process the flight data
- Flight notes for each flight
- Measurement List for each flight

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-068_mod0 CY 3

Task Order Title: ASCENDS

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall support the development and validation of measurement technologies, techniques and mission concepts for the ASCENDS, Carbon Hawk, and other related projects. This effort shall include the development of software for conducting simulations, analytical studies, and data reduction associated with atmospheric remote sensing projects. The contractor shall develop hardware and software for data acquisition and real-time analysis systems for atmospheric science investigations. The contractor shall develop, operate, and maintain lasers, detectors, control systems, and other elements of integrated remote sensing systems. The contractor shall provide on-site operations, systems, networks, and configuration support of the ASCENDS program. The contractor shall provide hardware support for lasers, detectors, control systems, and other elements of these remote sensing systems. The contractor shall support the planning, logistics, and execution of field experiments.

The contractor shall document the analysis and interpretations of science data in informal reports, papers, or journal articles.

Performance standards are as follows:

- Analysis and interpretations of science data are documented and/or presented within schedules agreed to between the Contractor and NASA Technical Monitor.
- Measurements are successfully captured and archived within schedules agreed to between the Contractor and NASA Technical Monitor.
- Laser and LIDAR system components and subsystems are successfully developed and operated within schedules agreed to between the Contractor and NASA Technical Monitor.
- Remote and in-situ measurement systems are developed, integrated, and tested on NASA airborne sciences platforms such as the UC-12, B200, DC-8, P3, and Global Hawk within schedules agreed to between the Contractor and NASA Technical Monitor.
- Planning and execution of airborne science field experiments are successfully developed and executed within schedules agreed to between the Contractor and NASA Technical Monitor.
- Support for the development mission concepts responsive to NASA mission needs is provided within schedules agreed to between the Contractor and NASA Technical Monitor.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

- Period of performance is award through October 31, 2009

- Milestones and schedules are as agreed to in monthly planning and coordination meetings between the Contractor and NASA Technical Monitor.

5.0 Deliverables/Reporting Requirements

Contractor shall deliver following to NASA Technical Monitor at agreed upon intervals and in specified formats:

- Experiment simulation results.
- Passive and active remote sensing, in situ, and satellite data analysis products.
- Resolution of all systems and configuration problems.
- Updates of system and standard products.
- Informal meetings as needed at the request of the customer.
- Contractor shall provide quarterly reports on progress, results, and issues electronically to NASA Technical Monitor
- Papers and journal articles as appropriate.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-070_mod0 CY 3

Task Order Title: Development of Technical Mission Concept (CLARREO)

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The objective of this Task is to enable completion of a Technical Mission Concept that successfully satisfies the Level 1 Science Requirements for the Climate Absolute Radiation and Refractivity Observatory (CLARREO), an Earth Science Decadal Survey Tier 1 Mission, managed through the Science Mission Directorate, NASA Headquarters. The Technical Mission Concept must provide a mission architecture that establishes a global climate benchmark record in the infrared and reflected solar regimes, and includes a GPS Radio Occultation measurement. It is also expected that CLARREO will provide an inter-calibration platform for on-orbit infrared and solar sensors. The CLARREO mission formulation team will develop the technical mission concept for approval by the Science Mission Directorate at a Mission Concept Review (MCR), targeted for Fall, 2009.

The contractor shall perform the following task requirements:

The contractor shall provide systems engineering, science instrument development, and program management expertise in support of the CLARREO mission formulation manager and team. The contractor will interact with the mission formulation team during all technical aspects of this task. The contractor will participate via conference call in weekly mission formulation team technical status meetings, and will provide technical feedback to the team as a Subject Matter Expert, to ensure successful technical definition and integration of CLARREO instruments and other sub-systems.

The contractor shall perform evaluation of technical documentation and design solutions developed during CLARREO Mission Concept Development (i.e., Mission Pre-Phase A). These evaluations will be geared at assessing readiness of the Technical Mission Concept to successfully complete the MCR process.

The contractor shall perform an assessment of team technical strengths and weaknesses, and readiness to proceed into Formulation (Phase A) after completion of the MCR.

3.0 Special Requirements

Access to Sensitive or ITAR Data: Null

Other (Specify):
N/A

4.0 Schedule/Milestones/Period of Performance

Period of performance is award through 10/31/2009

5.0 Deliverables/Reporting Requirements

Bi-monthly reports in accordance with TM instructions and distribution requirements

Informal Final Report in accordance with TM instructions and distribution requirements

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 1-071_mod0 CY 3

Task Order Title: SAGE III Assessment & Refurbishment

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide engineering and technical support for the Stratospheric Aerosol and Gas Experiment (SAGE III) project. The SAGE III project has been reformed with direction to perform an assessment of a spare SAGE III flight instrument that has been in storage since 2004. After completion of the assessment, the project may be directed to perform periodic instrument maintenance, support mission accommodation studies, and to perform other activities necessary to prepare the instrument for a flight opportunity.

The contractor shall provide engineering and technician support of the SAGE III flight instrument assessment. Contractor personnel shall develop and review test procedures, certify and configure required ground support equipment, develop instrument commands and configuration files, conduct the required tests, analyze test data, and write test reports for a (1) detailed instrument inspection, a (2) health and mechanism test, and a (3) comprehensive performance test. The contractor shall follow workmanship and process standards appropriate for spaceflight hardware and spaceflight ground support equipment and shall follow rigorous electro-static discharge protocols and clean room protocols. The contractor shall report problems or anomalies encountered using the non-conformance failure reporting process. The contractor shall review and re-catalog project files using the NASA LaRC provided "Nx" document management system.

The contractor shall also support the project office, working closely with Ball Aerospace and Technologies Corporation, in developing a comprehensive list of hardware or software items that require further analysis, refurbishment, and/or replacement necessary to prepare the instrument for flight. The contractor shall support the development of presentation material and shall present portions of the assessment results to management during a stakeholder review summarizing the results and findings of the assessment.

Performance Standards:

The contractor will be evaluated on the professionalism of the support provided and completion of assessment activities according to the assessment schedule.

Contractor personnel shall participate in meetings, in person whenever possible, presenting status and results, on schedules agreed upon between the contractor and the Task Monitor (TM).

3.0 Special Requirements

Access to Sensitive or ITAR Data: Yes

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is Award through October 31, 2009. Assessment evaluation points are summarized below.

- 1) Instrument Inspection Complete – May 7, 2009
- 2) BATC contract Award – May 12, 2009
- 3) GSE Ready for Health Test – May 22, 2009
- 4) Health Test Complete – June 4, 2009
- 5) GSE Ready for Functional Test – June 17, 2009
- 6) Functional Test Complete – July 15, 2009
- 7) Health Assessment Complete – July 29, 2009

5.0 Deliverables/Reporting Requirements

The contractor shall provide a monthly report to the TM via email or other electronic media covering accomplishments, issues, and plans. Engineering and technical results shall be reported to the TM and other team members as needed in an agreed upon format

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 2-001_mod1 CY 3

Task Order Title: Atmospheric Sciences Data Center (ASDC)

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

ASDC Operations

The contractor shall provide production and data management services for various satellite and data missions. Support shall be for the active mission plus a negotiated period afterwards for reprocessing.

The contractor shall collaborate with Instrument Teams, ASDC Management, and others as required to ensure system upgrades and enhancements meet planned production levels.

The contractor shall provide data production support to include processing requests; generating metadata to provide supporting information required for the Data Center's search and order systems; providing documentation of procedures and background information; and performing quality assurance.

The contractor shall maintain existing data holdings and acquire new data holdings in the area of Clouds, Aerosols, Radiation Budget, and Tropospheric Chemistry. This includes the transition of legacy Science Directorate holdings into ASDC as directed.

The contractor shall collaborate with ASDC Management to develop cost effective plans for migration of data holdings from current technology to new technology. Evaluate and revise metadata as part of the technology migration. Document new search and order techniques.

The contractor shall provide support to science teams to add new data to existing project/mission holdings or to replace with reprocessed data products. Organize data sets for efficient search and order, including extracting appropriate metadata or subsetting. Inspect all data entering the archive for conformance to supplied documentation and standard format.

The contractor shall report data holdings by project held including each project's total data volume, number of granules, number of orders for each project, and total volume distributed. Provide additional reports as requested by ASDC Management.

Data Management support shall include obtaining the input data required to support processing and providing documentation of procedures and background information.

The contractor shall collaborate with Instrument Teams to develop tools and techniques to verify data products are of high quality.

The contractor shall report data production levels. Provide additional reports as requested by ASDC Management. Develop internal schedules for major CERES reprocessing activities.

The contractor shall provide ingest, archive, distribution, and data management services for various satellite and data missions. Support shall be for the active mission plus a negotiated period afterwards for reprocessing. The contractor shall collaborate with Instrument Teams, ASDC Management, and others as required to ensure system upgrades and enhancements meet planned archival and distribution levels.

The contractor shall Data Management support to include obtaining data products for distribution; delivering products to customers; maintaining data holdings inventory; managing the logistics of filling orders; and providing documentation of procedures and background information.

The contractor shall report data statistics which include archive volume, total distribution, and non-science team distribution. Contractor shall also provide additional data operations status and statistics reports as requested by ASDC Management in response to ad hoc inquiries. These reports shall be provided electronically by the contractor.

The contractor shall perform physical property management to include performing property custodian functions, space management of assets in coordination with the Task Monitor, supporting property audits, and maintaining a current inventory of assigned property assets. The contractor shall maintain up-to-date data regarding systems, configurations, and interfaces to the Centers ODIN, LaRCNet and NEMS databases to support efficient and accurate SD system administration and management.

The contractor shall track the location of all Government tagged property in the System Configuration database. Systems Administrators shall ensure that all changes of equipment are tracked in this system.

The contractor shall record all maintenance actions taken on each piece of tagged equipment in the Maintenance Data Collection System.

The contractor shall support metrics collection including the ESDIS EMS system and provide data in a timely fashion.

ASDC Engineering and Development Support Task

1.0 Purpose

The Science Directorate needs support and assistance in the analysis, planning and execution of Information Technology improvements to the Science Computing Facility and to the Atmospheric Science Data Center. Contractor support for these improvements shall be conducted as a collaboration with the Government management of the ASDC.

The Science Technology and Analysis Research Support Services (STARSS) Contract provides support to the evolution of the Information Technology Systems in the Science Directorate (SD). The contractor shall work with the Government to evolve the assigned systems, consistent with Federal, NASA, Langley Research Center and SD policies and practices. The contractor shall employ sound system engineering practices to the development and maintenance of ASDC software systems. Practices shall include:

- Achieving established project goals and objectives
- Continuous identification and management of risks
- Adherence to established schedules
- Developing and maintaining project resource plans

The contractor shall, when appropriate, work effectively with other NASA contractors (e.g., ODIN) and the NASA Civil Servants to address and resolve issues.

There are two systems supported: the Science Directorate Servers (SDS), which includes the various shared systems and the Atmospheric Sciences Data Center (ASDC). There are a number of roles and the associated personnel who must work together to ensure the successful operations of these systems in the Science Directorate. Work under this Task includes all systems in Building 1250, 1268C and the SSAI Off-site offices at One Enterprise location. This document establishes clear communications between the SD System Owner, the SD Information Technology (IT) Security (ITS) Officer, the Task Monitor, the Contractor Task Manager, the development staff as to the responsibilities and authority of the various parties. It is intended to define clear responsibilities, authority and restrictions on the various roles.

1.1 Motivation

The SD, and in particular, the ASDC is responsible for the long term stewardship of the data with which has been entrusted. Long term remote sensing projects require stability and the reliability of the IT systems to ensure they continue to deliver the approved data products consistently over long periods of time, as specified by the appropriate Principal Investigator. The long term data stewardship responsibilities require constant attention to the state of ingest, archive, distribution and production of data products.

2.0 Categories of Personnel

2.1 Systems Analyst

A Systems Analyst evaluates the system against the needs of the Government's Data Center. They help to identify

requirements and ensure they have the appropriate specificity so that developers can implement them.

2.2 Software Engineer

A Software Engineer translates requirements into computer code which runs in the assigned environment and conducts the appropriate testing and analysis to debug the code.

2.3 System Engineer

A Systems Engineer applies the appropriate disciplines to guide the process of development and to develop a overall design and to characterize its expected performance. They consider life cycle cost, reliability, maintainability and availability, logistics support, system performance, etc.

2.4 System Integrator

A systems integrator helps to guide the overall system design so that it fits into the existing system with the appropriate improvements and changes.

2.5 Project Manager

The PM provides direction to other members of the development team. They integrate the system components into an entire system.

2.6 System Development Planner

The Planner translates plans and constraints activities into a well-formulated schedule, which realistically portrays the events required to complete the project.

3.0 Processes and Practices to be Employed

The contractor shall use these processes and practices, as a minimum, to do the work assigned in a way which improves system characteristics and is supportable.

3.1 CMMI

The contractor shall apply processes to the areas of configuration management and requirements management to achieve the equivalent of Capability Level 3 in the SEI CMMI model in each area to support system and software engineering.

3.2 Systems Engineering

Applying accepted industry standard Systems Engineering practices, the contractor shall tailor them to the needs of the specific system development project.

The contractor shall support appropriate boards required to support sound system engineering practices including documenting results.

Provide engineering assessments to support ASDC including providing trade-off analysis to support the Government planning process.

3.3 Configuration Management

Applying the Government Configuration Management Plan, perform configuration management of the ASDC and SCF systems. The contractor shall define configuration identification for systems and components. The contractor shall conduct configuration change control of systems and components. The contractor shall monitor configuration status and perform appropriate audits of systems.

3.4 Risk Management

The contractor shall identify risks to the cost, schedule or technical performance of the system. Risks shall be managed using Agency-approved practices and the degree of risk and its potential impact on the system development process evaluated and mitigated appropriately.

3.5 Planning and Scheduling of Engineering Projects

The contractor shall develop plans for significant efforts and have these plans reviewed and approved by the ASDC Civil Servant staff. These plans shall include careful resource allocations and expected skill mix assignments to yield a cost estimate. Analyze the schedule and task assignments for sensitivity to various changes and potential risks and recommend methods for improving schedule performance during the development/deployment process.

3.6 Track Actual Performance of work against Project or Development Plans

Monitor development activities against the planned activities and evaluate progress. Identify problems and issues related to performance against the critical path.

3.7 Documentation

The contractor shall produce and maintain appropriate documentation for all software and hardware systems and ensure the documentation remains current. Within six months of the start of this task, a complete and detailed set of system documentation shall be developed, to include as built systems and in-use procedures.

The contractor shall maintain a digital library of appropriate documentation for all software and hardware systems. The contractor shall maintain the currency and accuracy of data in the FAQ-o-matic FAQ (frequently asked questions) server and include pertinent FAQs from user requests for support.

The contractor shall maintain an electronic library, accessible to personnel with appropriate levels of privileges, of documentation for all software and hardware systems.

3.8 Information Technology Security

The contractor shall incorporate appropriate IT security requirements into all software and hardware sufficient to maintain a current Authorization to Operate under the Certification and Accreditation requirements.

4.0 Work to be Performed

The contractor shall develop systems and related components to support the ongoing stewardship of the assigned data products, and the assets of the ASDC and SCF.

4.1 Conduct Analysis of Systems and of Current and Potential Customers

The contractor shall provide recommendations to the ASDC Civil Servant staff for improvements and investments for the ASDC. The contractor shall identify areas to reduce cost while enhancing products and services; researching state-of-the-art alternatives and selecting the best option for near term impact; assessing the usefulness of the system for operations.

The contractor shall provide technical information and consultation to support the development of policies, security plans and procedures that promote optimal use of the Government's resources.

4.2 Design Systems and Components in Response to Government Approved Requirements

The contractor shall translate Government requirements into system design and evaluate how well they are met. Conduct walk throughs and collaboration with other team members. Support reviews, as appropriate.

4.3 Develop Systems and Components and Integrate Them into the System

The contractor shall maintain consistent configuration and usage procedures for all Atmospheric Sciences Competency mission critical systems.

4.4 Test and Evaluate Systems and Components

4.5 Deploy Systems and Components

Upon completion of the required testing and the Operations Readiness Review, the contractor shall deploy the system/components and promote them into operations.

4.6 Perform Engineering support to Operational Systems

Conduct monitoring and ongoing evaluation of system performance to identify system defects and issues. Troubleshoot them and propose Engineering Change Proposals to correct them.

5.0 Communications Requirements

5.1 Project Management Status

Provide status of tasks based on the agreed upon Project Plan.

5.2 System Development Communications

Conduct meetings periodically for discussion of the technical aspects and issues of a project as it evolves.

6.0 Planned Projects for Contract Year 3

- 6.1 ANGe v 1.2 (completion)
- 6.2 ANGe order tool
- 6.3 IBM Hardware Deployment and initial operations capability (completion)
- 6.4 MISR Order Tool (completion)
- 6.5 MISR integration into ANGe

ASDC User Services

The contractor shall provide the following user and data services:

Provide outreach, market research, technology transfer, and consulting.

Develop outreach materials and support a variety of outreach activities to educate scientists and the general public about the Atmospheric Sciences Data Center.

Provide broad visibility of data holdings and services.

Provide useful information about the projects the data center supports.

Incorporate non-science products of interest to state, local, and commercial customers into ASDC.

Foster the access to and use of atmospheric science data by commercial customers and state and local governments as well as other federal agencies.

Participate in the User Services Working Group to provide outreach through the development of materials and the participation in atmospheric science sponsored events.

Provide educational outreach support to atmospheric science missions.

Provide support for meetings as approved by the ASDC NASA Civil Servant staff.

Market data center products and services to increase the overall benefit to the American taxpayer and science community.

Explore on-line data visualization and analysis technologies to provide capabilities for quick and accurate data retrieval determinations and minimal data downloads to enhance productivity for Earth Science researchers and students.

Tap resources of Earth Science best practices in user interfaces by code reuse or creating interface for collaboration.

Identify new areas of opportunity where the ASDC may add value; present possible scenarios to the ASDC Management; and upon approval develop strategies for exploiting new areas of opportunity to attract customers, increase funding, or increase capability.

Transfer technology utilized in the ASDC through technical publications and partnerships.

Identify potential partnerships; present possible scenarios to ASDC Management; and upon approval provide technical consulting in a variety of areas such as management of large data sets, data production management, web development, and e-commerce.

Provide Data Provider Support, Data User Support, Metrics Tracking and Prediction, Outreach Materials, and Visualization Capability.

Data Provider Support includes developing documentation; performing Science Software Integration and Testing; providing Data Management/Analysis. Data Management/Analysis includes inspecting and verifying data integrity; working with data provider to develop sample read programs for data products and establishing requirements for services processing requests. Collaborate with Instrument Teams and Data Mission Teams to develop tools and techniques to verify data products are of high quality. Provide information to enable the timely search and order of publicly available data products. Collaborate with Instrument Teams or Data Mission Teams to develop strategy to

manage limited archive space.

Data User Support includes providing sample read programs for data holdings; providing data products and support services; providing broad visibility of data holdings and services, providing information about the projects the data center supports; and performing Data Management/Analysis.

Provide strategy and plan to broaden visibility for ASDC data holdings by employing standards to make our metadata more accessible to the world. Upon approval by ASDC management, implement the plan. Continue the maintenance of the infrastructure of the ASDC Open Archive Initiative - Protocol for Metadata Harvesting (OAI-PMH) Server that allows the metadata harvesting from NASA Aeronautics and Space Database (NA&SD) under the auspice of NASA Scientific and Technical Program Office (STIPO).

Provide strategy and plan to create infrastructure to allow more automated mechanism for the efficient creation, review and update of ASDC Projects and Datasets descriptions. This mechanism needs to allow the completion of all of ASDC projects and datasets descriptions currently absent or obsolete while creating data descriptions for new datasets on an ongoing basis. Upon approval of this plan by the ASDC management, implement infrastructure and begin utilizing the new process.

As negotiated with ASDC Management, develop and provide read or subsetting software for end users, as well as working with Principle Investigators on data management issues. Report inspection anomalies to the data producer and resolve any outstanding issues.

Provide an On-Call Service/Help Desk to respond to Data Provider and Data User inquiries and to provide definition of available services.

Develop and implement data center metrics tracking for customer contacts, number of unique data customers, data distribution, and user satisfaction. Data customers and distribution demographics shall be reported as a data center total, a total per state for all domestic requests, per country for all international orders.

Develop outreach materials to educate scientists and the general public about the ASDC.

Where direct funding exists, develop advanced visualization capability utilizing interactive, immersive visualization hardware and software to aid in the study of atmospheric science.

Report data center metrics quarterly as required by the Government Performance Reporting Act (GPRA). Contractor shall provide additional reports as requested by ASDC Management in response to ad hoc inquiries. These reports shall be provided electronically by the contractor.

System Administration Support Task

1.0 Purpose.

The Science Technology and Analysis Research Support Services (STARSS) Contract provides support to the Information Technology Systems and Users in the Science Directorate (SD). The contractor shall work with ODIN and SD customers in addressing user issues that fall outside the responsibility of ODIN on ODIN systems. This includes specialized software support and connectivity support to non-ODIN Science Directorate assets. The contractor shall provide system administration support to authorized systems and peripherals and to users, both onsite and offsite and in field campaign or travel situations, consistent with Federal, NASA, Langley Research Center and SD policies and practices.

There are two systems supported: the Science Directorate Servers (SDS), which includes the various shared systems and the Atmospheric Sciences Data Center (ASDC). There are a number of roles and the associated personnel who must work together to ensure the successful operations of these systems in the Science Directorate. Work under this Task includes all systems in Building 1250, 1268C and the SSAI Off-site offices at One Enterprise location. This document establishes clear communications between the SD System Owner, the SD Information Technology (IT) Security (ITS) Officer, the Task Monitor, the CONTRACTOR Task Manager, the User and the CONTRACTOR System Administrators as to the responsibilities and authority of the various parties on computer platforms under this NOW. It is intended to define clear responsibilities, authority and restrictions on the various roles.

1.1 Motivation

The need for a formalization of these roles and responsibilities is created by emerging Center, Agency, and Federal Government ITS policy regarding the system administration of computer systems. In addition, the policy to expand ODIN support to cover the majority of workstations and desktop computers necessitates a clear and explicit definition of the work.

2.0 Categories of Personnel

2.1 System Administrators

Certified System Administrators (SA) are those personnel who have completed the Center's requisite testing to certify their skill level in operating and maintaining computing systems. They are assigned work responsibilities to operate and maintain computing equipment. For each platform, a qualified SysAdmin is assigned; they may obtain support from other SysAdmins, who are not necessarily qualified on the particular operating system, provided the Qualified individual supervises the other's activities sufficiently to maintain responsibility for the machine themselves. Specifically, a certified SysAdmin may permit other personnel to perform SysAdmin functions, provided they maintain sufficient control to ensure these actions are proper.

2.2 Users

Users are those personnel, both Government and contractor, who need access to computation platforms to perform their functions, including development and testing of code, and have received proper authorization, including account names and access control measures, to run programs on specific computers.

2.3 System Owner

From an IT Security point of view, the System Owner is the responsible line manager, either Branch Head or Competency Head or duly appointed designee. Responsibilities for enforcing the provisions of this tasking and adjudicating any disputes reside in the System Owner.

2.4 Information Technology Security (ITS) Officer

Branch/Directorate ITS Officers are responsible for ensuring that protective measures are adequate for the value of the information contained within a given IT system. They are also responsible for monitoring compliance with this tasking to the extent necessary to avoid violation of Center ITS policy.

2.5 Task Monitor

The Government employee responsible for oversight and review of this Task on the STARSS contract.

2.6 Task Manager

The Contractor employee responsible for managing the work and workforce under this Task on the STARSS contract.

2.7 Lead System Administrator

The contractor employee who provides day to day direction and quality control of the SysAdmin workforce. They are responsible for deploying the SysAdmin workforce, determining who is in which location and the work assignments of each SysAdmin. They are also responsible for ensuring the technical competence of the SysAdmin workforce and ensuring proper qualification and training of these individuals.

2.8 IT Security Assistant

The contractor employee who provides day to day IT Security operations support, including planning, monitoring and documentation. They are responsible for planning, monitoring and documentation of the IT Security Certification and Authorization processes in the Science Directorate and will provide advise and recommendations to the SD IT Security Officer. They shall obtain and maintain a secure Public Key Infrastructure (PKI) based application and use it to communicate digital information securely.

3.0 Classes of Computers

3.1 Science Directorate Server (SDS) system computers are those network attached devices which are shared among multiple users, none of whom use the machine as their personal desktop computer. Examples of these devices include printers, file servers, database servers, PC or UNIX platforms, CITRIX Metaframe servers, etc. Since they provide services to multiple Users, a certain level of standardization is required and authorized usage is much more constrained. Operations should be maintained 24 hours per day, 7 days per week, except by special arrangement with the Task Monitor.

3.2 ASDC Systems are the computers used directly in the meeting of the ASDC mission that are not maintained by ODIN. Examples of these systems include the JBOSS and WWW Servers, the ingest, archive production and distribution systems. These shall be maintained in an operational status 24 hours per day, 7 days per week, except by special arrangement with the Task Monitor.

3.3 User Workstations are PC, Macintosh, SGI or Sun computer systems whose primary purpose is to provide computational services to a single individual even though the computer system may have multiple user accounts. These machines are planned to be maintained by ODIN. The STARSS contractor System Administrators have no responsibility for these systems, except, as these systems interface to the servers and site licensed software.

3.4 Lab and field systems are any make of computer which is used primarily to operate or to take data from laboratory equipment and instruments or are used in the field and cannot be maintained by ODIN because of specialized configurations. These

4.0 Responsibilities for SDS and ASDC Systems

4.1 System Administrators Responsibilities for SDS and ASDC Systems

The contractor shall perform standard, industry-practice system administration functions for assigned systems.

4.1.1 System Administrators are responsible for:

4.1.1.1 Initial configuration of the system, and installation of appropriate standard service packages.

4.1.1.2 Installation of user applications and special application packages upon user request and appropriate approval.

4.1.1.3 Installation of all OS upgrades and patches and application upgrades, as required, to ensure safe and proper operation.

4.1.1.4 Notification of the Users of all configuration changes, including the provision of an interpretation of the impact on the Users.

4.1.1.5 Periodic review, on at least a semi-annual basis of platform configuration to identify any unauthorized alteration or attempts to break into the system.

4.1.1.6 Ordering maintenance of the hardware, either preventive or corrective..

4.1.1.7 Report to the Task Manager and the Task Monitor inappropriate or unauthorized usage of the system.

4.1.1.8 Monitor system usage and planning for system configuration changes or expansions necessary to ensure system availability to the users.

4.1.1.9 Maintain NASA Brainbench Certification current for the operating systems assigned.

4.1.1.10 Conduct, with the Task Monitor and the Branch ITS Officer, a review of all user accounts for re-authorization on an annual basis.

4.1.1.11 Schedule system outages to minimize impact on the users and providing advance notification of these outages.

4.1.1.12 Maintain the postgres and MySQL database servers with appropriate redundancy or mirroring

4.1.1.13 Support, as a minimum, the SD authorized software list not covered by ODIN. The contractor shall provide online documentation for these software systems.

4.1.1.14 Support the development and maintenance of websites and dynamic data delivery tools upon request by authorized SD users identified by the TM. Any significant development efforts shall be coordinated, approved, and prioritized by the TM.

4.1.1.15 Provide assistance to the authorized users of assigned systems, in response to requests by the users, through a common help request system. All requests shall be logged by either users or Systems Administrators and normally closed out in one to ten business days depending on the complexity and criticality of the request. The majority of requests are for information or troubleshooting problems with user systems; any requests involving policy formulation/change and programming shall be referred to the TM for authorization. When appropriate, users shall be referred to ODIN for support. All help requests entries shall be closed out in ten business days unless otherwise authorized by the TM.

4.1.2 SA's are accountable for the following:

4.1.2.1 User accounts are created only with proper authorization;

4.1.2.2 Ensure that all OS and application patches are installed according to the configuration management plan and all security patches are installed within prescribed timeframes.

4.1.2.3 Perform configuration management in accordance with SD IT CM Plans. Maintain accurate configuration identification of the systems involved, including architectures, manuals, and diagrams. As required, obtain appropriate waivers for deviations from approved system configurations and all documentation of approval. They

shall maintain an inventory of license installation and currency of maintenance.

4.1.2.4 Maintain accurate inventories of hardware, software and network configurations.

4.1.2.5 Maintain the accuracy and currency of the authorized User Account Tracking System, including the authorization forms for each user account.

4.1.2.6 Respond in a meaningful way to 98% of the User Support Help Desk tickets within 1 working hour. Close tickets by completing the required work to restore full service, not by generating new tickets. Close 95% of all tickets within 3 working days. Report all tickets which have been open longer than 3 working days to the Task Monitor on a daily basis.

4.2 ITS Assistant Responsibilities for SDS and ASDC Systems

4.2.1 The ITS Assistant is responsible for monitoring and reporting on the day to day activities related to IT Security. They shall ensure a high level of their knowledge of ITS policy and practices relevant to systems at Langley Research Center. They shall be a certified System Administrator.

4.2.2 The ITS Assistant shall provide recommendations as to the means for implementing policies. They shall provide recommendations as to modifications of the System Security Plan. They shall process and evaluate all requests for waivers to policy and maintain records of waiver approval.

4.2.3 The ITS Assistant shall prepare recommended documentation for personnel approval for access to SD systems, including Information Protection Plans. They shall maintain records associated with these approvals.

4.2.4 The ITS Assistant shall develop ongoing strategies for user account authorization and authentication and the integration of the SD needs/solutions along with the Center and Agency requirements and systems.

4.2.5 The ITS Assistant shall oversee SysAdmin processes related to ITS breaches and all preventive measures. They shall monitor scans and address high and medium vulnerabilities on an urgent basis.

5.0 Responsibilities for Lab and Field Equipment

Lab and Field Equipment within the scope of this task are not managed or supplied by ODIN.

5.1 System Administrators Responsibilities for Lab and Field Equipment

5.1.1 System Administrators of Lab and Field Equipment are responsible for:

5.1.1.1 Initial installation and configuration of OS and OS/network services and standard software.

5.1.1.2 Verifying installation of patches and correcting any missing patches within prescribed timeframes for the OS and standard applications.

5.1.1.3 Creating user accounts for only those users with proper authorization and maintaining the records of these accounts.

5.1.1.4 Periodic testing of account passwords to ensure compliance with NPD 2810.1

5.1.1.5 Maintaining backup copies of OS, application and user files, current within prescribed timeframes.

5.1.1.6 When requested by the user, installing only properly licensed software and maintaining records for each machine of their installation and associated authorization.

5.1.1.7 Periodic review of platform configuration and logs to identify any unauthorized alteration, hardware or software failures or attempts to break into the system.

5.1.1.8 Monitoring the ITS Scanning website and, within 1 day of the notification of a scanning vulnerability, correcting the problem or disconnecting the system until corrective action can be accomplished and notifying the SD ITS Officer of any such vulnerabilities/actions.

5.1.1.9 Conducting, with the TASK Monitor and the SD ITS Officer, a review of all user accounts for re-authorization on at least an annual basis.

5.1.1.10 Initial configuration of OS and applications consistent with Center policies;

5.1.1.11 Maintaining the currency of OS configurations and patches and application updates, as appropriate;

5.1.1.12 Maintaining current backups of user data to restore data storage in the event of a disk failure, hacker attack or user error in deleting files;

5.1.1.13 Maintaining records of which applications are installed on each workstation and what license and registration information is used;

5.1.1.14 Reporting system failures, faults or inappropriate usage when they are discovered;

5.1.1.15 Maintain records of all network services running from a machine and who turned them on and when;

5.1.1.16 Ordering maintenance of the hardware, either preventive or corrective.

5.1.1.17 Within 1 day of the notification of a scanning vulnerability, correcting the problem or disconnecting the system until corrective action can be accomplished;

5.1.2 System Administrators of Lab and Field Equipment are restricted from:

5.1.2.1 Impeding proper use of the equipment by authorized users.

5.2 IT Security Assistant Responsibilities for Lab and Field Equipment

The ITS Assistant is responsible for monitoring and reporting on the day to day activities related to IT Security. They shall ensure a high level of their knowledge of ITS policy and practices relevant to systems at Langley Research Center. They shall provide recommendations as to the means for implementing policies. They shall ensure that equipment which has been reconfigured for use off the LaRCNet is properly configured before it is re-attached to the network. Any deviations shall be covered by the appropriate waiver requests.

The contractor ASDC performance shall be evaluated on:

- Policies, rules and regulations with respect to Information Technology Security are adhered to.
- Computer systems and database maintenance is accomplished in a manner to ensure continuity of services.
- Software testing and configuration management activities are conducted to ensure appropriate levels of reliability and risk mitigation.
- Provide monthly report on data statistics, including archive volume, total distribution, and non-science team distribution during the first week of each calendar month.
- Participate in science team meetings, or other activities in support of the data providers and educational outreach.
- Meet schedule requirements for ANGe and other Evolution activities.

The Contractor shall meet the following performance standards in providing systems administration support to the SD:

- Websites/databases/archives are updated within an agreed to timeframe (schedules provided in monthly reports as needed);
- Required documents identified by the TM are delivered within agreed to schedules (schedules designated in monthly reports when appropriate);
- Perform required system administration functions on workstations, servers and related peripheral equipment, including security patching within 1 week of release (except high critical patches within 1 day) and regularly scheduled backups of all systems;
- Respond to user service requests within 2 hours (from 7am to 6pm, Monday through Friday, except Federal Holidays) in 95% of the requests;
- Attend and report at all CERES Data Management Team meetings, as well as other SD Data Management Team as requested.

3.0 Special Requirements

Access to Sensitive or ITAR Data: Yes

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009

5.0 Deliverables/Reporting Requirements

Performance Area Goal Measurement

Ongoing

Budget Planning for labor, travel, training, maintenance, and other direct costs Stay within approved annual plans

Variance < 2%

GPRA Increase Archive volume 20% per year

Data Customers and Data Products Delivered Meet AtSC defined standards Increase per annum

Media Data Delivery Fill media orders in 1 wk 90% within 7 days

FTP Data Delivery Fill FTP orders in 2 days 90% within 2 days

Customer Support Resolve customer inquiries quickly 80% within 5 business days

Reporting Provide weekly technical progress reports with production/distribution statistics

Provide monthly summary progress reports Delivery by COB each Friday

Meet contract requirements

ESDIS Support Participate in USWG

Provide inputs for DAAC Work Plan Attend USWG meetings; meet USWG milestones

Inputs delivered by negotiated date

LATIS Diagrams Maintain current LATIS logical and functional diagrams Update quarterly

Target Year

New Mission Support Provide accurate cost estimates of ASDC services to potential customers Use Cost Estimating

Tool to generate estimates for ASDC Operations Manager

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-001_mod1 CY 3

Task Order Title: Electronics Parts and Components Engineering Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall support the Electrical, Electronic, and Electro-mechanical (EEE) parts Office by providing technical support for EEE activities including selection of quality parts for space and high reliability products. Support shall include researching EEE parts and providing recommendations (oral & written) on their use for the intended environment and providing designs to mitigate risk associated with the use of these EEE parts. The contractor shall make recommendations for purchase and costing analysis and performance trade-offs. Analysis tasks shall include Government-Industry Data Exchange Program (GIDEP) search alerts and recommendations as well as other environmental and quality component issues. Component radiation performance shall be reviewed for parts suitability in the application. Routine work product and deliverable task items shall be in MS Office format. Support shall include office meetings - routine , technical interchanges, parts control board and program reviews. When necessary, design support and analysis shall be necessary to aid the selection or substitution of necessary EEE parts for project usage. The aforementioned support level shall be extended to cover recommendations to the LaRC Office of SMA as well as other NASA centers for EEE parts analysis support tasks. In support of component application and implementation, materials and assembly processes support/analysis shall be provided to ensure proper EEE parts reliability is maintained for any given design application. Additional performance criteria:

- Reporting of accomplishments to be made quarterly to the Technical Monitor (TM), within 30 days of completion of the reported quarter
- Parts are researched, analyzed, selected and recommendations provided as agreed upon with the TM
- Designs are analyzed and recommendations provided to support EEE parts issues as required
- Documentation provided to support parts purchasing recommendations
- Teleconferences in support of the DC-DC/Hybrid microcircuits NEPP activities
- Maintain collection of parts related data list sets (i.e approved parts vendors, part performance radiation test results etc...)

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

- Field activities (support may be required by administering LaRC efforts at other NASA centers, i.e. program meetings or reviews)
- Meeting support for programs as required, typically 4-6 per year.

4.0 Schedule/Milestones/Period of Performance

Quarterly report of accomplishments submitted electronically to TM.

Schedules for specific activities will be agreed upon between the contractor and the TM in informal weekly meetings typically held on Monday morning of each week.

Monthly DC-DC converter teleconferences in support of NEPP user community hybrid microcircuit information and knowledge communication & transfer effort.

Period of Performance is November 1, 2008 through October 31, 2009

5.0 Deliverables/Reporting Requirements

Reports, Parts Lists, Component and Circuit Analysis shall be submitted as agreed upon with the TM in support of various EEE Parts activities. A minimum of (12) DC-DC converter Monthly meeting/teleconferences shall be conducted in support of EEE parts NEPP activities. Other meeting communications may be required & are determined based on the annual road map of goals set for in the NEPP activity. Exceptions shall be noted with due carry-thru of alternate & applicable make-up activities. A projected support strategy/plan shall be developed to establish annual goals for NEPP support activities and serve as a guide to working short term and long term NEPP activities.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-002_mod0 CY 3

Task Order Title: Flight Test Article Development and Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall:

Provide system design and integration support for Electronic Systems Branch's (ESB) projects as described below.

Provide system and sub-system level electronics design, modeling, integration, and test support for exploration Flight Test Articles (FTA) such as the Ares I-X, CM/LAS, atmospheric science instruments such as the CLARREO and ASCENDS studies, TTSS project, and CO Sensor development.

Provide system level requirements and verification support for exploration projects such as, but not limited to, the Constellation Program Level II requirements definition and review and Ares I-X.

Conduct trade studies and assessments for proposal recommendations and exploration projects of electronic system hardware. Provide work schedules, cost estimates, and personnel requirements for project tasks. Support bi-weekly planning and project team meetings by providing status and updates to the trade studies and schedules.

Participate in weekly or bi-weekly planning meetings and review or write proposal sections in support of science and programmatic issues for proposal submittals and projects such as the CLARREO project.

Develop/recommend hardware integration test plans and procedures. Lead or co-lead in conducting the test procedures.

Serve as the electronics section lead in proposal and design reviews on an expected three proposals a year and four design reviews a year.

Occasional travel shall be required to fulfill these objectives for project reviews and technical interchanges. Expect up to twelve trips a year for about three days with half the trips to the mid-west and the other half to the west coast.

Performance Standards:

Trade studies, analyses, requirements documentation, and procedures are delivered within agreed to times that align with the project schedules.

Design solutions meet or exceed the technical performance requirements of the projects.

Trip reports, technical interchange documents, and review notes and recommendations are due within ten working days after the trip, technical interchange meeting (TIM), or design review.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):
N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009

Ares I-X:

Complete verification artifacts links and archiving by 4/2009.

Complete review of the Verification Requirement documents by 11/2008.

Complete review of the Operational Test Requirements documents by 12/2008.

Complete review on the Work Authorization Description documents by 4/2009

Complete review of the FS Acceptance Data Package by 2/2009.

Complete review of the Avionics Acceptance Data Package by 3/2009.

5.0 Deliverables/Reporting Requirements

Reports, test plans and procedures, schedules, system-level and subsystem designs of flight systems, hardware trade studies. Shall be delivered electronically to the TM within ten days after completion of the task.
Monthly status reports to be sent electronically to the TM.

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-004_mod1 CY 3

Task Order Title: Advanced LIDAR Systems

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide engineering and scientific support for development of advanced laser and lidar systems as follows:

- Support design, integration, implementation, and testing of coherent lidar systems. Design and perform experiments involving lasers and lidar systems meeting the objectives of Science Mission and Exploration Systems Mission Directorates programs.
- Test 3-D Imaging lidar systems and perform data analyses for entry, descent, and landing (EDL) applications. Develop lidar models predicting performance of different lidar systems in achieving specified requirements for landing missions to the Moon and Mars.
- Characterize 3-D Imaging lidar components and subsystems, and evaluate their performance in an integrated lidar instrument.
- Develop models and lidar data analysis software for analyzing the coherent and 3-D Imaging lidars.
- Support technical meetings and NASA review meetings.

Performance Standards:

System designs are completed on a schedule to meet the major project milestones.

Systems, subsystems, and components tests are completed within schedules agreed to by the contractor and the Task Monitor (TM)

Tests of lidar systems acquire useful data for evaluating potential applications (e.g., EDL).

Software for data acquisition and associated documentation are developed and checked out within schedules agreed to by the contractor and the TM.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of performance: November 1, 2008 through October 31, 2009

Provide laser and LIDAR support to ongoing development efforts for planetary exploration and science programs. Technical thrusts of support shall include coherent detection lidar applications, design and implement LIDAR systems. NASA's goals are to develop new lidar systems with improved performance over prior art while achieving decreased size, increased efficiency, and decreased operating costs. The top-level project milestone schedule, forecasted based on current plans in meeting NASA's needs in achieving its future space exploration and earth/space science objectives, is summarized below: The contractor shall support and align efforts with the project milestones.

12/30/2008 Analyze the coherent lidar helicopter test data

01/30/2009 Characterize the performance of 3-D Imaging lidar for fixed-wing aircraft flight tests

04/30/2009 Integrate and test 3-D Imaging lidar and laser altimeter for fixed-wing aircraft flight tests

10/31/2009 Integrate coherent lidar prototype system for additional aircraft flight tests

5.0 Deliverables/Reporting Requirements

The experimental data, and modeling and data processing software shall be provided per milestone schedule above. The contractor shall submit the following reports:

Monthly status reports submitted electronically to the TM.

Annual report submitted electronically to the TM in November describing experiments performed, performance level achieved, lessons learned, and recommendations for further improvements in system and future work. The report shall include summary of the experimental data and supporting documentation and copies of publications.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-005_mod0 CY 3

Task Order Title: Mid-IR Laser Technology Development

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

2.1 The contractor shall perform mid-infrared solid state laser research and development. Tasks shall include but are not limited to, theoretical calculations, computer modeling and simulation, and perform laboratory experiments in the areas of solid state laser oscillators, solid state laser amplifiers, pump laser diodes, optics alignment and optimization, and performance characterization as required for the research. The contractor shall also develop technologies leading to space-qualifiable lasers by investigating the areas of material out gassing and contamination, radiation damage, vibration resistance, and vacuum operation. The contractor shall develop and implement laser frequency stabilization and control techniques to mid-infrared lasers.

2.2 The contractor shall support concurrent design projects in four laboratories located in the Systems Engineering Directorate at LaRC. The contractor shall perform optical design, electrical design, and laser operation optimization for continuous-wave and pulsed, diode-pumped, solid-state 2-micron lasers. The contractor shall collaborate with LaRC researchers in the enhancement of the 2-micron pulsed laser technology focusing in the areas of pulse energy, beam quality, wall-plug efficiency, compactness, ruggedness, and lifetime; with the goal of simultaneously achieving 250-1500 mJ pulse energy, $< 1.4 \times$ diffraction limit beam quality, 1.4% wall plug efficiency, compactness, ruggedness compatible with autonomous aircraft flight, and 0.1 – 1 billion shot lifetime.

2.3 The contractor shall contribute to the development of Lidar Technologies to include but not limited to detectors covering the 1-2 micron wavelength range, both diffraction-limited and non-diffraction-limited telescopes with diameters from 10-25 cm, conical step-stare scanners with diameters from 10-25 cm, alignment technologies for both coherent and noncoherent (direct) lidar systems covering wavelengths from 1-2 microns, custom power supplies, custom electronic control circuitry, specialized test set ups, by performing theoretical analyses, operating relevant computer software written in C, C++, LabView, and Visual Basic, and performing the supporting laboratory experiments in the appropriate Systems Engineering Directorate lab as determined by the task monitor.

2.4 Performance Standards:

The contractor performance shall be evaluated on:

- The developments of mid-infrared solid state laser are accomplished by schedules agreed upon by the NASA Technical Monitor and contractor
- Analysis and interpretation of science data are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor
- Required documents are received within time period requested by NASA Technical Monitor
- Data bases, web sites, and graphical products are created within time period requested by NASA Technical Monitor

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009

5.0 Deliverables/Reporting Requirements

All deliverables shall be provided electronically to the TM as agreed upon with the contractor and TM.

- Monthly report providing current status and accomplishments for the task to be provided electronically.
- The design drawings, analysis and hardware of high repetition Ho laser.
- The design drawings, analysis and hardware of engineering hardened 2-micron laser.
- Electronic report describing experiments performed, performance level achieved, lessons learned, and recommendations for further improvements in system and future work as required by NASA Technical Monitor
- Experimental data and supporting documentation provided electronically as required by the NASA Technical Monitor
- Publications and presentations provided electronically as required by the NASA Technical Monitor

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-006_mod0 CY 3

Task Order Title: Compact Laser Development

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

2.1 The contractor shall perform mechanical design, thermal design, and robust packaging design for continuous-wave and pulsed, diode-pumped, solid-state 2-micron lasers. The contractor shall contribute to the laser system level integration and control by investigating the optimum mechanical and thermal requirements of each subsystem and devising subsystem interconnection approaches. The contractor shall collaborate with LaRC in designing an engineering hardened 2-micron lidar system capable of aircraft flight, and in designing a system to control the lidar system operation by computer.

2.2 The contractor shall develop technologies leading to space-qualifiable 2-micron lasers by investigating the areas of material out gassing and contamination, radiation damage, vibration resistance, and vacuum operation.

2.3 Performance Standards:

The contractor performance shall be evaluated on:

- The design of instrument suites are accomplished by schedules agreed upon by the NASA Technical Monitor and contractor
- Analysis and interpretation of science data are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor
- Required documents are received within time period requested by NASA Technical Monitor
- Data bases, web sites, and graphical products are created within time period requested by NASA Technical Monitor

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

November 1, 2008 through October 31, 2009

5.0 Deliverables/Reporting Requirements

- Monthly reports (electronic format) on accomplishments, plans, progress, and issues delivered to the Technical Monitor (TM) by the end of each month.
- Monthly financial reports (electronic format) to the Technical Monitor (TM) by the end of each month. The financial reports shall provide separate financial information if there is sub-contract involved in the report.
- Design drawings, analysis and hardware of laser components delivered within 2 weeks of completing the work
- Report describing experiments performed, performance level achieved, lessons learned, and recommendations for further improvements in system and future work. The report shall be delivered (electronic format) to the TM quarterly

(March, June, Sept, Dec)

- Experimental data and supporting documentation delivered to TM within 1 month after completion of experiment or on other schedule as agreed upon between the contractor and the TM.
- Publications and presentations as appropriate to document and present results

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-007_mod1 CY 3

Task Order Title: Computer Aided Engineering and Design (CAEDE) Lab Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide Application Software Engineering (ASE) support for the Computer Aided Engineering and Design for Electronics (CAEDE) servers and workstations in building 1202. The contractor shall provide support for all related CAEDE engineering activities onsite at LaRC. Specifically, the contractor shall:

- Maintain the Computer Aided Engineering and Design for Electronics (CAEDE) servers, workstations, and peripherals in Building 1202 in good working order.
- Provide CAEDE server operations, systems, and networks support.
- Provide CAEDE Application Software Engineering (ASE) support to the user community.
- Provide configuration management and other user services to CAEDE clients for the related engineering activities on-site at LaRC.
- Provide monthly off-site archiving of all CAEDE data/software at a location greater than thirty miles from the LaRC facility. Archival media shall be treated as Sensitive But Unclassified (SBU) information.

The contractor shall provide the technical staff and work processes to accomplish the requirements specified in the Task Order. Responsiveness will be an important metric for task performance. The contractor shall keep the government informed of all activities, such as work successes, problems, and potential problems, as soon as they are known. The contractor shall respond rapidly and effectively to the customer's dynamic, unanticipated, and emergency work requirements by restructuring priorities. The format of technical progress reports (see 5.0, Deliverables) will be established with the TM to provide maximum value and communication.

These reports will be used to confirm priorities and current schedule constraints continually, and to communicate the work areas of the WBS planned for the coming month. Metrics for delivery schedules will be established and evolved through the planning mechanism of the technical progress reports.

The Contractor will follow rigorous ISO, safety, and IT Security standards. Specific task quality requirements are established with the TM on a continual basis during the performance of the task. Performance is monitored through periodic reviews with the TM and through formal semiannual surveys. The Contractor will provide a technical status report to the TM in a format and on a schedule as requested.

Performance Standards to be met:

1. The existing Configuration Maintenance Plan (CMP) shall be updated within two (2) weeks of start of task order.
2. The contractor shall verify and apply new updates to software within two (2) weeks of receipt. If the software is unsuitable for installation on the designated host, the contractor shall notify the CAEDE management as soon as unsuitability is determined.
3. All requests of the contractor to provide formal documentation shall be accomplished within five (5) working days of the request due date or date of request.
4. Computer system crashes shall be resolved and the system restored to operation within one (1) working day unless the necessary hardware or software to restore the system is unavailable.
5. All operating system updates to the computer systems shall be completed within two (2) working days, or as soon as permitted, after receipt of the updates from LaRC IT security, the Task Monitor, or other designated source.
6. The contractor shall complete installation of any CAEDE hardware or software upgrades within ten (10) working days of receipt and shall perform the necessary tests to ensure the return of the machine to proper working order after receipt of the equipment from CAEDE Management.
7. System functionality shall be restored within one shift of failure contingent upon availability of parts
8. Backups shall be 100% restorable and provided to the customer upon completion.
9. Required documents shall be delivered within 2 weeks of request electronically to the NASA Technical Monitor
10. Contact reports to document meetings between the contractor and CAEDE management shall be delivered within 5 business days after the meeting.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

3.1. Travel

Included in the cost plan is the cost to cover a trip to one relevant meeting.

4.0 Schedule/Milestones/Period of Performance

Period of performance is November 1, 2008 through October 31, 2009

5.0 Deliverables/Reporting Requirements

1. Following resolution of CAEDE computer system crashes and/or installation of operating system updates, the contractor shall insure that the CAEDE computer system is fully operational.
2. After any system crash incident, the contractor shall send an email to the CAEDE Task Monitor providing status, assessments, and work performed.
3. On a weekly basis, the contractor shall email to the CAEDE Task Monitor a status log documenting work done during the previous week including tasks performed, problems encountered, etc.
4. E- mail shall be delivered to the Task Monitor within five (5) working days or upon receipt from the contractor's accounting section after the calendar end of the month showing status of hours used.
5. The contractor shall provide contact reports to document all meetings between the contractor and CAEDE Management and provide copies to all attendees of the meeting electronically.
6. The contractor shall provide an updated Configuration Maintenance Plan electronically including methodology for:
 - Resolution of system and configuration problems
 - Backup of all units on a prioritized schedule
 - Updates of system and standard products
 - Recommendations for replacement of failed components and migration to new architectures. Initial update of the existing Configuration Maintenance Plan (CMP) shall be delivered within two (2) weeks of start of task order. Subsequent CMP updates shall be provided by the contractor to the NASA Technical Monitor based upon an agreed upon schedule.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-008_mod0 CY 3

Task Order Title: Doppler Lidar Signal Processing

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall implement signal processing software for a coherent Doppler lidar used for measuring wind, aerosols, and CO2 concentration. Specifically, for wind measurements hardware and algorithms are to be developed for a next-generation signal processing system and its future implementation on board an aircraft. In this task year the hardware should be completed and made ready for ground-based lidar measurements. This hardware includes a cPCI host computer, a digitizer, and digital signal processor. Computer algorithms and code developed in previous years for ground-based wind measurement will be migrated to the new hardware system and made ready for system-level lidar tests performed by the Government in 2009. An improvement to the ground-based processor should be implemented in the form of a modification to the nonlinear adaptive Doppler shift estimation technique (NADSET) developed in previous years. Support over approximately 2 weeks may be required for a field measurement taking place in Summer 2009 in Beltsville, Maryland. Work should also begin in this Task year on adapting the wind measurement algorithms to an aircraft, incorporating software upgrades toward measurements made from an aircraft in which Doppler shift from the aircraft may occur.

Performance Standards

The contractor performance shall be evaluated on:

- Algorithm development and testing are accomplished by schedules agreed upon by the NASA Technical Monitor and the contractor.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009

Milestones:

- March 2009: software migration complete of software to new signal processing hardware.
- June 2009: development of refined NASDET algorithm.
- August 2009: refined NADSET results run on May/June field data.
- October 2009: block-diagram level and pseudo-code level designs complete for aircraft based wind measurements..

5.0 Deliverables/Reporting Requirements

Computer code and documentation (electronic format) for techniques and algorithms to be delivered to TM after first

year of performance.

6.0 Other information needed for performance of task

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-010_mod1 CY 3

Task Order Title: Robotic Testbed for Sensor Validation and Algorithm Development

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide mechanical, electrical, and software design support for the development of robots and other intelligent electromechanical systems. The contractor shall perform architecture definition, electrical and mechanical design, software development, integration, fabrication, and testing. The contractor shall develop real-time algorithms for embedded systems using real-time operating systems, which may include RT Linux or Windows XP Embedded.

The contractor shall provide mechanical, electrical, and software design support for the development of robots and other intelligent electromechanical systems. The contractor shall also assist with architecture definition, software development, hardware integration, fabrication, and field testing.

The contractor shall provide engineering support in the area of electromagnetic compatibility (EMC). Such work may include detailed numerical analysis, review of standards and test results, estimations of system level EMC parameters, determination of the adequacy of EMC practices in place, and interaction with both contractor and government engineers.

Performance standards:

- Quarterly reports are complete and are submitted on time.
- Attendance at technical meetings either through telecons or in person.
- Analysis of EMC topics (both numerical and qualitative).
- Trade study results are accurate and contain details of plans and results.
- Software and hardware function as planned, associated documentation is complete and all deliverables are submitted to the TM per agreed to schedules.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

Contractor will be required to sign non-disclosure agreements for company-sensitive information.

4.0 Schedule/Milestones/Period of Performance

Period of performance: November 1, 2008 through October 31, 2009

Milestones:

- Complete design of innovative robotic rover
- Complete software development for robotic platforms
- Demonstrate cooperative algorithms using mini robotic platforms

- Complete EMC analysis and review tasks as assigned through October 2009.

Schedules are to be agreed upon between the contractor and the Task Monitor (TM).

5.0 Deliverables/Reporting Requirements

Deliverables:

- Trade study results to include designs, test/evaluation plans, results, and analyses, as applicable, delivered electronically or via other appropriate media to the TM within 2 weeks following completion of the work.
- Reports describing the suitability of new technology or simulations results delivered in electronic form to TM on a schedule agreed upon between the contractor and the TM.
- Design and software documentation in electronic format delivered to TM on a schedule agreed upon between the contractor and the TM.
- Electronic or mechanical hardware, as applicable, delivered to the TM on completion.
- Software source code, as applicable, delivered to TM within 30 days of completing code development and checkout.

Reporting:

- Quarterly status reports summarizing progress, key results, plans, and issues shall be delivered electronically to the TM at the end of each quarter.
- Weekly informal verbal reporting of progress on EMC tasks.

6.0 Other information needed for performance of task

Tools and equipment will be furnished by government as needed.

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-013_mod1 CY 3

Task Order Title: Unmanned Aerial Vehicle Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

Support shall be provided in flying or training other individuals on flying small remotely piloted or autonomous aerial vehicles including Generic Transportation Model (GTM) research aircraft. Provide assistance in maintaining, repairing, and constructing aircraft for the AirSTAR project as required. Design, develop, and test flight control sensors, autonomous hardware, and ground station for UAVs. This activity may include interfacing commercial-of-the-shelf hardware with LaRC designed hardware. Test programs shall be developed and executed including actual flight test. Designs and test results shall be documented in Microsoft Word / Excel format and delivered electronically to the NASA Task Monitor in the form of an email message describing the content of work accomplished.

The contractor performance shall be evaluated on:

1. Calibration, integration and deployment of work performed that are accomplished by schedules agreed upon by the NASA Technical Monitor and contractor
2. Analysis and interpretation of science data are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor
3. Required documents are received within time period requested by NASA Technical Monitor

Additional performance criteria:

Reporting of costs, charges, and accomplishments to be made quarterly, within 30 days of completion of the reported quarter and provided electronically to the NASA Task Monitor

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

Field activities (Support may be required at various airfields that can support UAV flying).

Meeting support (Presentation may be required at meetings safety reviews, or accident boards)

4.0 Schedule/Milestones/Period of Performance

Period of Performance November 1, 2008 through October 31, 2009

Milestones shall be project specific and determined prior to start of tasks and agreed upon by NASA Technical Monitor.

5.0 Deliverables/Reporting Requirements

The contractor shall provide test reports, designs and parts lists electronically to the NASA Task Monitor as agreed to between the Contractor and the NASA Task Monitor.

6.0 Other information needed for performance of task

Performance of this task will require some travel including trips to LaRC for meetings and to pick up or deliver parts and products. Trips to Smithfield, VA. will be required as part of the flight operations, training and testing of UAV systems and components being developed. And finally, trips to Wallops Flight Facility will be required as part of the AirSTAR flight testing and research test support. The following is an estimate of the number of travel events that will take place between the 11/1/2008 and 10/31/2009 period of performance:

Trips to LaRC for meeting and deliveries ~ 12 one day trips

Trips to Smithfield, VA for flight training and operations ~ 12 one day trips

Trips to Wallops Flight Facility for flight research tests ~ 3 five day trips

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-014_mod0 CY 3

Task Order Title: MEDLI QA Support for assembly, test and polymer applications of Space Flight hardware

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide Quality Assurance support for the development of the MEDLI Project as follows:

- Support the assembly of flight hardware. This shall include the following:
 - o Verify that the equipment (torque screw drivers, power supplies, meter, etc) are in calibration.
 - o Observes the step-by-step assembly of the hardware to verify that it has been done according to procedure.
 - o Observes the application of polymers and verifies that the process has been done according to manufacturers specifications.
 - o Monitors that the assembly of the hardware is done in a safe manor so that neither those working on the hardware nor the hardware will be at risk of accident.
- Maintain the flight logbooks, issue Non-Conformance Failure Reports (NFR) as required and close out NFR's once they have been dispositioned. This shall include the following:
 - o Keep a log sheet that describes daily activities.
 - o Generate Non-conformance Failure Reports (NFR) when components or assemblies do not match drawings or procedures.
 - o Close out NFR in a timely fashion so the assembly of hardware could proceed forward.
 - o Tracks the mate and de-mate of flight connectors.
- Provide oversight of the Flight bonded stores. This shall include the following:
 - o Quality assurance shall verify that components, both electrical and mechanical are logged into and out of bonded stores.
 - o Verify that all the components are flight component and that there is documentation for traceability.
 - o Verify that the polymers are flight products and have not exceeded the expiration date.
 - o Perform random checks of the bonded stores to verify that they are properly maintained.
- Support the following environmental tests: Burn-in, Thermal Vacuum, Vibration, Shock and EMI. This shall include the following:
 - o Verify that the test equipment is within calibration.
 - o Verify that the proper people are participating in the test.
 - o Verify that the test set-up is properly configured.
 - o Observe the test and verify that the test is being run according to procedure.
 - o Document changes in testing by red-lining documents.
 - o Document failures.
 - o Stop tests that are being conducted in an unsafe manor.
- Review test procedures.
- Support technical meetings and NASA review meetings. Most meetings can be supported by telecon; however, a total of 3 trips to JPL, partners or vendors may be required.

Performance Standards

- Results produced by the contractor are clear, concise, and technically correct.
- Required documents are received within time period requested by the NASA Technical Monitor.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009

5.0 Deliverables/Reporting Requirements

- Finalize all build book documentation and close out all NFR's
- Final review of bonded stores

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-016_mod0 CY 3

Task Order Title: Conductively Cooled, Space-Qualifiable Laser Development

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

2.1 The contractor shall perform a detail trade study that reviews key lidar and conductively cooled, space-qualifiable laser design concepts, evaluate the best pump diodes for use in the 2 μ m Risk Reduction Laser (RRL), develop concepts for further hardening the pump head and laser technology, identify and assess the risk areas associated with the laser development, and estimate the cost for building the 2 μ m RRL.

The tasks include but are not limited to (1) to perform detail trade study between the single power oscillator and Master Oscillator Power Amplifier (MOPA) laser design architecture; (2) to review robust laser cavity designs to meet the alignment insensitive requirement for the space laser; (3) to analysis and design a most efficient thermal management sub-system; (4) to develop suitable pump diode parameters; (5) to improve the rigidity of the entire wind lidar transmitter system design; (6) to develop a conceptual design for the transmitter that will be used in the 2 μ m RRL laser; (7) to perform reliability study of this laser including injection seeding and to evaluate and rank the risks associated with using the conceptual 2 μ m laser design in a space-based mission.; (8) to propose the cost and schedule for developing the RRL; (9) to perform detail mechanical design, including mechanical drawings, for the transmitter that will be used in the 2 μ m RRL laser;(10) to provide cryogenic expertise in experimental design, and laboratory prototyping for use in cryogenic laser research

2.1.1 Based on the LARC demonstrated 2-micron laser technology and the detail trade study performed in 2.1, the contractor shall perform the detail design of the RRL. The detailed design can be divided into three main steps, optical, mechanical and thermal. The optical design shall consider margin for derating the pump diode laser. The mechanical design shall provide high alignment insensitivity of laser to meet the space laser requirements. The thermal management design shall provide high efficiency. The detail mechanical drawing and necessary analysis results shall be provided.

2.2 Performance Standards:

The contractor performance shall be evaluated on:

- Analysis and interpretation of science data are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor
- Required documents are received within time period requested by NASA Technical Monitor
- Data bases, web sites, and graphical products are created within time period requested by NASA Technical Monitor

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009

5.0 Deliverables/Reporting Requirements

All deliverables shall be provided electronically to the TM as agreed upon with the contractor and TM.

- Support a meeting at LaRC at the 1 month point to review progress on the trade study
- Monthly report providing current status and accomplishments for the task to be provided electronically.
- The detailed mechanical design drawings and analysis of the RRL.
- Electronic report describing experiments performed, performance level achieved, lessons learned, and recommendations for further improvements in system and future work as required by NASA Technical Monitor
- Experimental data and supporting documentation provided electronically as required by the NASA Technical Monitor
- Publications and presentations provided electronically as required by the NASA Technical Monitor

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-017_mod0 CY 3

Task Order Title: Active Sensing of CO2 Emissions over Nights, Days, and Seasons (ASCENDS) Mission Development

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The Active Sensing of CO2 Emissions over Nights, Days, and Seasons (ASCENDS) laser sounder mission, consists of simultaneous laser remote sensing of CO2 and O2 on a global scale using a satellite platform in earth orbit. The mission would result in the first global column measurement of CO2 that will aim to determine the land and ocean sources and sinks of CO2. In a 2007 report entitled "Earth Science and Applications from Space: National Imperatives for the Next Decade and Beyond", the National Research Council (NRC) supported a mission launch date for ASCENDS in the 2013 to 2016 timeframe.

NASA is the lead for the ASCENDS mission development and requires contract engineering support to develop instrument performance models, conduct hardware development, and support field testing. This field testing shall also include extensive aircraft flights demonstrating the CO2 and O2 measurement in a variety of surface and atmospheric conditions – for example, but not limited to development of an instrument model to predict performance, collection and analysis of data collection from aircraft flights to determine the correlation with instrument model results, and hardware laser risk reduction activities.

The unique skills and capabilities of the contractor under this task order are critical to the objectives of the ASCENDS mission development activity.

Performance Standards

The contractor performance shall be evaluated on:

- Instrument performance models are developed by schedules agreed upon by the NASA Technical Monitor and contractor.
- Development of instrument hardware (examples are laser transmitters, receivers, and electronics) is accomplished by schedules agreed upon by the NASA Technical Monitor and contractor.
- Calibration, integration and deployment of instrument suites are accomplished by schedules agreed upon by the NASA Technical Monitor and contractor
- Required documents are received within time period requested by NASA Technical Monitor

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009

5.0 Deliverables/Reporting Requirements

The contractor shall provide informal status reports (monthly) to the Task Monitor (TM) to summarize the work completed over the prior month. This report shall also contain a schedule update and work plan update for the following month, or more.

6.0 Other information needed for performance of task

Contractor will supply any computer hardware or software need to accomplish the task.

The contractor shall be required to support several meetings in support of this task. Travel may be required to international locations, or within the United States. Several technical interchange meetings are expected during the performance period. They will occur at Ft. Wayne, IN.

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-018_mod0 CY 3

Task Order Title: Ultra-Low Temperature Mechanism Research and Development

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

Introduction

NASA's Exploration Program requires electro-mechanical systems that operate in extreme temperature conditions on the surface of Moon, Mars and in deep space. The required operating temperature may extend to as low as 40 degrees Kelvin. A multi-center research and development program was established to meet this technological need. At LaRC, the Ultra-Low Temperature Mechanisms (ULTM) is aimed to develop and evaluate mechanisms that can survive and operate at extreme cold temperatures. To accomplish the goals of ULTM, a new ultra-low temperature mechanism research platform (ULTMRP) will be integrated with a data acquisition system (DAS); and the resulting system will be used to conduct the necessary studies for the research program.

Description of Work

The contractor shall:

Task 1: Integrate the JPL motor-actuator into the low temperature research platform

Task 2: Conduct an extensibility study on the JPL/Aeroflex motor-actuator at low temperatures

Task 3: Provide system dynamic modeling and finite element analysis to support mechanism simulation.

Task 4: Conduct a study to evaluate and to determine the appropriate technologies for use to improve thermal interface and to enhance heat transfer.

The contractor shall provide engineering design and analysis for establishing an experimental setup to test two Phytron motors simultaneously in a 90 degree configuration. The tests shall be conducted in a cryogenic vacuum chamber that can cool down to 15 Kelvin. Work to include, conceptual layout, design analysis and detail design to properly configure the motor on the cryo-cold plate and to route the output shafts to the appropriate rotary feed-thru for eventually connection to two dynamometers. Delivery shall include documentation for design analysis, fabrication drawings, and ancillary hardware and prototype ready for laboratory testing.

Performance Standards

The contractor performance shall be evaluated on:

- Integration of the DAS, dynamometer, motor controller are accomplished by schedules agreed upon by

the TM and contractor

- Measurements are captured and archived before agreed upon deadlines between the TM and contractor
- Analysis and interpretation of experimental data are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor
- Required documents are received within time period requested by NASA Technical Monitor

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009

- Task 1 shall be completed by 2/15/2009
- Task 3 shall be completed by 10/31/2009
- Task 4 shall be completed by 10/31/2009
- Task 5 shall be completed by 10/31/2009

5.0 Deliverables/Reporting Requirements

- Monthly reports (electronic format) on accomplishments and data acquired shall be delivered to the NASA Technical Monitor (TM) at the end of each month after award of task.
- The contractor shall deliver data products including designs, documentation, test/evaluation plans, modeling techniques, software source code, characterization results, and analysis to the TM as applicable. The data products shall be delivered within 1 month after completion or as agreed upon between the contractor and the TM electronically or other media as appropriate.
- All hardware and software for the integration of the ULTMRP and the dynamometer shall be delivered and integrated in a location to be specified by the TM.
- Final report documenting the experimental test data on the JPL/Aeroflex motor actuator.
- Reports, presentations and publication papers as needed to document the dynamic simulations.
- Final report documenting the thermal study.

6.0 Other information needed for performance of task

Government Furnished Equipment, Facilities and Procedures

- The ultra-low temperature mechanism research platform (cryo-test chamber)
- Dynamometer and motor controller
- Location and utilities for test platform
- JPL/Aeroflex actuator

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-019_mod0 CY 3

Task Order Title: Data Processing for Lidar Ranging Systems

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

Signal processing and image reconstruction is needed for the various sensors tested at NASA LaRC's Sensor Test Range (STR). The STR was designed to characterize the performance of 3-Dimensional imaging sensors. Because of the various system architectures and technologies used in the design of these sensors, most signal processing algorithms and image reconstruction methods will require system specific analysis of the sensor under test.

The contractor shall perform analyses of sensor performance data and derive/present the sensor performance characteristics. This activity shall include, but are not limited to:

1. Range measurement accuracy.
2. Range measurement precision.
3. Range resolved resolution.
4. Angular resolution.
5. Radiometric analysis.

In addition, any systematic errors or observations discovered about the sensor shall be analyzed and reported. The goal of this task is to understand the strengths and limitations of the sensor and the technologies used in the design of the sensor through experimental data analysis. The development of a multivariate statistical method which summarizes the quality of retrieval of the STR test panel for each candidate imaging sensor undergoing testing is required to help rank the sensors and technologies.

2.1 Performance Standards

The contractor performance shall be evaluated on:

- Analysis and interpretation of science data are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor
- Required documents are received within time period requested by NASA Technical Monitor

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance: November 1, 2008 through October 31, 2009

The Contractor shall meet with the Task Monitor during the first week of each month to set schedules and priorities for data processing for that month. Priorities depend on instrument performance and analysis of previous results and cannot be determined in advance. The contractor shall not be expected to process all data received from the

instrument provider; rather the contractor shall analyze the data subset selected in concert with the TM in their monthly schedule/priority meetings. The contractor shall discuss analysis results with the TM and other technical personnel within 1 week after results are obtained and prepare the results for presentation and/or distribution as appropriate on schedules agreed to by the contractor and TM.

5.0 Deliverables/Reporting Requirements

Monthly report of accomplishments delivered in electronic format to the TM by the end of the following month.

Report describing the multivariate statistical method developed for assessing the various sensors and technologies is due at the end of the contract/task period.

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-020_mod1 CY 3

Task Order Title: Mission and Instrument Design Support for Decadal Survey Mission Concepts and Remote Sensing Instrument

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall support instrument and mission studies derived from the 2007 Academy of Sciences Decadal Survey including GIFTS, CLARREO, ASCENDS, GEOCAPE, ASCENDS, ACE, GACM and the global 3D-winds mission. The contractor shall support science and instrument teams and participate in mission design workshops and Integrated Design Center (IDC) sessions, instrument design workshops and IDC sessions, and technology development projects to support advanced mission concepts. In addition, the contractor shall support existing Science development projects such as the Instrument Incubator Projects (IIP): INFLAME, FIRST, CORSAIR, CO2 DIAL, GOLD, and the Wind Doppler demonstration, as well as planned instrument proposal opportunities such as the MASTER proposal to the MIDDP opportunity, the Raman Spectrometer instrument development for the PIDDP opportunity, and the SABER-based response to the Small Explorer (SMEX) opportunity.

The support shall involve electro-optical instrument design to develop, deploy, and improve remote sensor-based instrumentation for airborne and space measurements and to support the development of new space-based instrumentation for atmospheric science and planetary research. The contractor shall support efforts to determine what measurements are most appropriate for the mission application, design the proper instrumentation, and model the instrument performance. The contractor shall apply expertise in radiometry, linear and nonlinear optics, computer programming, electronics, data acquisition and processing, radiometric calibration techniques, and atmospheric spectroscopy to assist in the design of electro-optical instrumentation to meet desired measurement requirements.

Instrumentation is expected to include infrared radiometers, infrared atmospheric sounders including Fourier Transform Spectrometers, and lidar systems. The work combines intricate understanding of lasers, laser systems, detectors, software, firmware, electronics, thermal subsystems, mechanical subsystems, space-hardware production processes, optical design, and the relevant space environment with a thorough understanding of component and system level characterization to develop unique sensing systems. The work requires an understanding of science algorithms and knowledge of basic principles to implement novel and unique solutions that become the new baseline and/or state-of-the-art remote instrument systems. The work requires an understanding of scientific objectives and the translation of scientific requirements into instrument subsystem requirements.

Performance standards

- Monthly report of accomplishments is made within 30 days of completion of the reported month.
- Technical evaluations are delivered as agreed upon by the contractor and the Task Monitor (TM).
- Technical results produced by the contractor that are selected by the TM for distribution or presentations are clear, concise, and technically correct.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance: 11/1/2008 through 10/31/2009

The Contractor shall meet with the Task Monitor during the first week of each month to set schedules and priorities for data processing for that month. Priorities depend on instrument performance and analysis of previous results and cannot be determined in advance. The contractor shall not be expected to process all data received from the instrument provider; rather the contractor shall analyze the data subset selected in concert with the TM in their monthly schedule/priority meetings. The contractor shall discuss analysis results with the TM and other technical personnel within 1 week after results are obtained and prepare the results for presentation and/or distribution as appropriate on schedules agreed to by the contractor and TM.

5.0 Deliverables/Reporting Requirements

Monthly report of accomplishments delivered in electronic format to the TM by the end of the following month.

6.0 Other information needed for performance of task

The Contractor shall support meetings as required. For planning purposes, assume quarterly week-long trips to Washington D.C.

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-023_mod0 CY 3

Task Order Title: MEDLI Mission Operations Manager

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

Mission Operations Manager (MOM) who will be responsible for the development and implementation of the MEDLI Mission Operations Plan (MOP) at LaRC, ARC, Lockheed Martin Space Systems Corp. (LMSSC) (Denver), JPL and KSC. The MOM will monitor and document all MEDLI mission operations activities. During mission activities, the MOM will interface with MSL Mission Operations team to provide input into the activities as related to MEDLI Mission Operations. The MOM will also work closely with MEDLI Science and Engineering to assure procedures are being followed completely.

Description of Work

The contractor shall:

- Participate in and support technical and operations interchange meetings with NASA, JPL, and LMSSC in which Mission Operations issues are addressed. In person support shall be provided when needed.
- Support MEDLI Integration and Test activities at LaRC, LMSSC, JPL, and KSC.
- Participate in Mars Science Laboratory (MSL) Mission Operations activities (e.g. ORDs/simulations) at JPL and/or KSC to support MEDLI systems.
- Review Mission Operations procedures and data with NASA. In person support shall be provided when needed.
- Define and coordinate the operational interfaces required to collect MEDLI and required ancillary data from MSL's Central Data Management and Handling and deliver it to the MEDLI engineering and science teams.
- Provide analyses, as required, to assess the impact of mission operations on mission success.
- Develop plans for data archival

Performance Standards

The contractor performance shall be evaluated on:

- Establishing a rapport and regular communication with the MSL Mission Operations Team
- Is an effective advocate for MEDLI Mission Operations requirements
- Completes reports and documents on time
- Effectively interfaces with MSL Mission Operations
- Successfully implements the MEDLI Mission Operations Plan
- Successfully delivers raw MEDLI and required ancillary data from MSL to MEDLI within 3 days of MSL landing on the surface of Mars
- Successfully archive the MEDLI and ancillary flight data

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of performance is November 1, 2008 through October 31, 2009

5.0 Deliverables/Reporting Requirements

Status Reports: Bi-Monthly:

Submit status report electronically via email to MEDLI Task Technical Monitor by the last business day of the month.

MEDLI Mission Operations Plan: March 14, 2009:

Update the MEDLI Mission Operations Plan with approvals from MEDLI and MSL

Provide a MEDLI Mission Operations lessons learned report to MEDLI Task Technical Monitor at completion of the task

6.0 Other information needed for performance of task

Travel is required to complete this task. It is estimated that there will be travel to ARC, LMSSC - Denver, and JPL to support testing, and final mission operations. At this time, 7 trips with durations of 4 days or less each are anticipated (for reviews and technical interchange meetings) and 3 trips with durations up to 10 days.

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-025_mod1 CY 3

Task Order Title: CERES FM-5 Electronics Parts and Component Engineering

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide support for the FM5 Instrument project's Electrical, Electronic, and Electro-mechanical (EEE) parts review effort. This should include efforts for providing technical support for existing parts in the FM5 payload as well as possible new EEE activities including selection of new hi-reliability parts for any additional instrument modifications and/or the FM6 flight instrument effort. Support shall include researching EEE parts and providing recommendations (oral & written) on their use for the intended environment and providing analysis on parts application in designs to mitigate risk associated with the use of those EEE parts. The contractor shall make parts recommendations based on component technical performance, schedule criticality and cost trade-offs. Analysis tasks shall include Government-Industry Data Exchange Program (GIDEP) search alerts and recommendations as well as other environmental and quality component issues. Component radiation performance shall be reviewed for parts suitability in the various instrument electronics assembly applications. Routine work product and deliverable task items shall be in MS Office format. Support shall include office meetings - routine, technical interchanges, parts control board and program reviews. When necessary, parts analysis, review and design application shall include communication with the CERES (FMx) prime instrument support contractor for the necessity to aid the selection or substitution of necessary EEE parts for project usage. The aforementioned support level shall be extended to cover recommendations to the LaRC Office of Safety & Mission Assurance (SMA) as well as other Langley center activities which also support the FM5/FM6 project program. The contractor shall be able to provide EEE Parts support knowledge unique to the understanding of the longevity of the FM5 instrument and the risks associated with utilizing the components contained in the FM5 flight hardware. This support should enable the identification of critical items, their prioritization and timely review for risk assessment purposes. In addition, analysis & reports of information in support of the FM5 EEE Parts Program will be used to aid the preliminary parts engineering effort for FM6 instrumentation risk assessment PM&P activities.

Performance Standards

- Reporting of accomplishments to be made monthly to the Technical Monitor (TM), within 5 business days of completion of the reported period
- Parts are researched, analyzed, reviewed and possibly selected with recommendations provided as agreed upon with the TM
- Designs are analyzed and recommendations provided to support EEE parts issues as required
- Documentation provided to support parts analysis and recommendations on risk assessment

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

- Field activities (support may be required by administering LaRC efforts at Instrument Subcontractor Worksite (, i.e. program meetings or reviews, technical interchanges)
- Meeting support for programs as required, typically 3 trips total required.

4.0 Schedule/Milestones/Period of Performance

Monthly report of accomplishments submitted electronically to TM. Schedules for specific activities will be agreed upon between the contractor and the TM in formal weekly meetings typically held on Tuesday morning of each week.

Period of Performance is November 1, 2008 through October 31, 2009.

5.0 Deliverables/Reporting Requirements

Parts Plans, Work Break down analysis, Reports, Parts Lists, Component and Circuit Analysis shall be submitted as agreed upon with the TM. Meeting/teleconferences shall be conducted in support of EEE parts activities as required. Please Note: Monthly reports of accomplishments submitted electronically to TM.

6.0 Other information needed for performance of task

Parts list information and other instrument sub-component related information provided by the Instrument subcontractor and NASA Langley Research Center

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-027_mod0 CY 3

Task Order Title: EVA IR Camera Quality Assurance (QA) Support for Assembly, Test and Polymer Inspection of Space Flight Hardware

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide Quality Assurance support for the refurbish and recalibration of the EVA IR Cameras:

- Support the assembly of flight hardware. This shall include the following:
 - o Verify that the equipment (torque screw drivers, power supplies, meter, etc) are in calibration.
 - o Observes the step-by-step assembly of the hardware to verify that it has been done according to procedure.
 - o Observes the application of polymers and verifies that the process has been done according to manufacturers specifications
 - o Monitors that the assembly of the hardware is done in a safe manor so that neither those working on the hardware nor the hardware will be at risk of accident.
- Verify that the procedures for the disassembly and reassembly of the EVA IR Camera are included in the flight logbooks, issue Non-Conformance Failure Reports (NFR) as required and close out NFR's once they have been dispositioned. This shall include the following:
 - o Keep a log sheet that describes daily activities.
 - o Generate Non-conformance Failure Reports (NFR) when components or assemblies do not match drawings or procedures.
 - o Close out NFR in a timely fashion so the assembly of hardware could proceed forward.
 - o Tracks the mate and de-mate of flight connectors.
- Provide oversight of the Flight bonded stores. This shall include the following:
 - o Quality assurance will verify that components both electrical and mechanical are logged into and out of bonded stores.
 - o Verify that all the components are flight component and that there is documentation for traceability.
 - o Verify that the polymers are flight products and have not exceeded the expiration date.
 - o Perform random checks of the bonded stores to verify that they are properly maintained.
- Support the Acceptance Tests at Johnson Space Flight Center (approximately 1 week). This shall include the following:
 - o Verify that the test equipment is within calibration.
 - o Verify that the proper people are participating in the test.
 - o Verify that the test set-up is properly configured.
 - o Observe the test and verify that the test is being run according to procedure.
 - o Document changes in testing by red-lining documents.
 - o Document failures.
 - o Stop tests that are being conducted in an unsafe manor.
- Review test procedures.
- Polymer certification needs to be current through the task period.
- Support technical meetings and NASA review meetings. Most meetings can be supported by telecon; however, a total of 1 trip to JSC will be required for the Acceptance Test.
- Work with the Mission Assurance Branch (MAB) to ensure required quality assurance policies/procedures are

implemented and completed. In addition to the technical NASA Task Monitor, report quality activities/status/issues to the assigned MAB Point-of-Contact (POC):

Name:

Mail Stop:

Phone:

E-mail:

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance: November 1, 2008 through October 31, 2009

5.0 Deliverables/Reporting Requirements

- Finalize all build book documentation and close out all NFR's.
- Final review of bonded stores.

6.0 Other information needed for performance of task

The task is a low level of effort not to exceed 110 hours. Activities will be driven by JSC's ability to get the replacement EVA IR Camera manifest onto a Shuttle flight.

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-028_mod0 CY 3

**Task Order Title: 2-Micron Lidar Demonstration
Flights**

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

Lidar aircraft-flight demonstration can be a complex and involved process. There is much development and design customization to properly integrate the lidar system for reliable and safe operation of the instrument. The overall work is to develop the necessary technology to fully deploy the 2-micron lidar system including the transceiver with control electronics, steering optics, telescope, scanner, cooling subsystem, and lidar processing electronics with data acquisition system on flight missions. The details of the involved tasks are described in the following subsections.

Description of Tasks

Task 2.1 shall be completed by 2/1/2009.

2.1 The contractor shall collaborate with LaRC to conduct development, and detail design of the mechanical system required for the safe and operational installation of the 2 micron lidar system for use on the NASA DC-8 Airborne Laboratory, based at NASA's Dryden Aircraft Operations Facility, Palmdale, CA. Work included but not limited to task planning and scheduling, propose system concepts, perform machine, structural, vibration and thermal analyses in support of the design concept, and detail prototyping design for the chosen concept.

Task 2.2 shall be completed by 10/31/2009.

2.2 The contractor shall develop the necessary hardware prototypes from Task 1 above for system demonstration.

Task 2.3 shall be completed by 10/31/2009.

2.3 The contractor shall collaborate with the TM to prepare the necessary review and presentation package for the DC-8's Aircraft Safety Review Board.

Performance Standards

The contractor performance shall be evaluated in according to the followings:

- The engineering development of the concept and detail design of the chosen concept in timely schedules agreed upon by the TM and contractor
- The craftsmanship and functionality of the necessary hardware prototypes are to be completed by schedules agreed upon by the TM and contractor
- Performing analysis and interpretation of results are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor
- Required documents are received within time period requested by NASA Technical Monitor

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):
N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is 11/1/2008 through 10/31/2009

- Task 2.1 shall be completed by 2/1/2009
- Task 2.2 shall be completed by 10/31/2009.
- Task 2.3 shall be completed by 10/31/2009

5.0 Deliverables/Reporting Requirements

- Monthly reports (electronic format) on accomplishments and data acquired shall be delivered to the NASA Technical Monitor (TM) by the 15th of each following month.
- The contractor shall deliver data products including designs, documentation; test/evaluation plans, modeling techniques, characterization results, and analysis to the TM as applicable. The data products shall be delivered within 1 month after completion or as agreed upon between the contractor and the TM electronically or other media as appropriate.
- All prototyping hardware for the integration onto the DC-8 shall be delivered and integrated in a location to be specified by the TM.
- Final report documenting the design, analysis and aircraft safety review.

6.0 Other information needed for performance of task

Not Applicable

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-031_mod0 CY 3

Task Order Title: Orion Rel Nav DTO - Sys. Eng., Avionics, Star Tracker

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

For the Orion Relative Navigation DTO project -

The contractor shall:

1. Provide avionics system design, development, integration, and testing under Space Shuttle environmental requirements. The system shall include high speed data interfaces, data routing, large capacity data storage, Shuttle interfaces, and a power system.

Deliver an avionics simulator that simulates the flight system consisting of a VMetro system and data recorder. Also deliver flash solid state memory drive units for radiation qualification testing. Deliver both items by Dec. 30, 2008.

Present the requirements and avionics design at the PTR1 in Nov. 08.

Present the avionics design at PTR2 in Feb. '09.

Present the final flight avionics design at PTR3 in Jul.'09.

All flight designs shall be finished and functional test bed completed by Sep.'09.

Write the final versions of the Avionics ICDs.

Provide cost, schedule, and resource estimates.

Provide digital and power system design, if an in-house build is selected.

Provide environmental qualification test plans and procedures.

Write test reports no later than 14 days after test has been performed

Provide data flow modeling.

2. System Engineer of the Project. Produce the Systems Requirements Document (SRD) and final version of the project level Interface Control Documents (ICDs). Support writing of the Verification and Validation document.
3. Support the Star Tracker requirements review. Participate in Star Tracker design reviews, acceptance testing, and calibration planning and testing. Provide Star Tracker integration and test plans and procedures. Provide trade study options for Star Tracker lab testing.
4. Participate in weekly team meetings and telecons, project technical interchange meeting (TIMs), design reviews, instrument contractor review and telecons. Occasional travel shall be required to fulfill these objectives for project reviews and technical interchanges. Expect up to six trips a year each for about three days each to the mid-west area. Also expect 2 trips per person per year to support radiation testing for about 4 days each trip.

Performance Standards:

Trade studies, analyses, requirements documentation, and procedures are delivered within agreed to times that align with the project schedules.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):
N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is 11/1/2008 through 10/31/2009.

Project specific, determined prior to task, and agreed upon by technical monitor.

Milestones:

PTR1 Review 11/30/2008

PTR2 Review 2/28/2009

PTR3 Review 7/30/2009

These dates are based on the project's schedule so these dates could change as the project's milestones change.

5.0 Deliverables/Reporting Requirements

Reports, test plans and procedures, schedules, system-level and subsystem designs of flight systems, hardware trade studies. Shall be delivered electronically to the TM within ten days after completion of the task.

Monthly status reports to be sent electronically to the TM.

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-032_mod0 CY 3

Task Order Title: DAWN-AIR1 Project Management

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

For the DAWN-AIR1 project –

The contractor shall:

Provide Project Management, task division, scheduling, resource planning and loading, cost estimating and tracking, task tracking, trade studies, and system analysis from preliminary design through flight. Lead or co-lead team meetings, design reviews, TIMs, telecoms, and project status presentations. Manage and monitor the development of a Doppler wind lidar system composed of pulsed laser, local oscillator laser, rigid optical bench, small and large optics, electronics, computer, cooling system, data acquisition and processing and display and archive, GPS/INS, and power system. Lead the design, development, integration support, and testing support under aero flight environmental requirements. Manage and monitor interactions with the NASA DC-8 aircraft group.

Occasional travel shall be required to fulfill these objectives for project reviews and technical interchanges. Expect up to three trips a year each for about three days within the continental US.

Performance Standards:

1. Project schedules, resource planning documents, trade studies, systems analyses, requirements documentation, and procedures are delivered within agreed to times that align with the project schedules.
2. Design solutions meet or exceed the technical performance requirements of the project.
3. Trip reports, technical interchange documents, and review notes and recommendations are due within ten working days after the trip, technical interchange meeting (TIM), or design review.
4. Written test reports no later than 14 days after test has been performed.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

4.0 Schedule/Milestones/Period of Performance

Period of Performance 11/1/2008 through 10/31/2009.

Project specific, determined prior to task, and agreed upon by technical monitor and COTR.

Milestones:

Critical Design Review 4/3/2009

The following dates are beyond the current Year 3 period, however, are being shown for information purposes:

Flight Test Operational Safety Review 12/9/2009

Airworthiness Safety Review Board 3/17/2010

Flight Readiness Review 4/16/2010

EMI Testing 6/1/2010

Functional Check Flight 6/8/2010

Instrument Check Flight 6/9/2010

Science Flights 6/11/10 – 6/24/2010

These dates are based on the project's schedule so these dates could change as the project's milestones change.

5.0 Deliverables/Reporting Requirements

Reports, test plans and procedures, schedules, system-level and subsystem designs of flight systems, hardware trade studies. Shall be delivered electronically to the TM within ten days after completion of the task.

Monthly status reports to be sent electronically to the TM.

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-033_mod0 CY 3

Task Order Title: Orion Rel Nav DTO - Data Storage Development

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

For the Orion Relative Navigation DTO project –

The contractor shall:

1. Provide flight data storage system design, development, integration support, and testing support under Space Shuttle environmental requirements. The system shall include high speed fiber channel interfaces, solid state recorder interfaces, RAID6 reliability, data routing, large data storage capacity (~2T with expansion to ~6T)., and shall meet mass, volume, power, radiation susceptibility requirements for a Space Shuttle mission.

Provide a prototype system of the data storage system to test out the flight design.

Provide and/or support trade study options.

Provide cost, schedule, and resource estimates.

Provide data flow modeling.

Write test reports no later than 14 days after test has been performed

2. Participate in weekly team meetings and telecons, project technical interchange meeting (TIMs), design reviews, and telecons.

Occasional travel shall be required to fulfill these objectives for project reviews and technical interchanges. Expect up to three trips a year each for about three days to the East coast area.

Performance Standards:

Trade studies, analyses, requirements documentation, and procedures are delivered within agreed to times that align with the project schedules.

Design solutions meet or exceed the technical performance requirements of the projects.

Trip reports, technical interchange documents, and review notes and recommendations are due within ten working days after the trip, technical interchange meeting (TIM), or design review.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

4.0 Schedule/Milestones/Period of Performance

Period of Performance is 11/01/2008 through 10/31/2009.

Project specific, determined prior to task, and agreed upon by technical monitor and COTR.

Milestones:

Fully functional single drive system	12/1/2008
Complete RAID 0 system	1/15/2009
Complete RAID 6 system	2/15/2009

These dates are based on the project's schedule so these dates could change as the project's milestones change.

5.0 Deliverables/Reporting Requirements

Reports, test plans and procedures, schedules, system-level and subsystem designs of flight systems, hardware trade studies. Shall be delivered electronically to the TM within ten days after completion of the task.

Monthly status reports to be sent electronically to the TM.

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-034_mod1 CY 3

Task Order Title: Noise Estimates in Node I STA

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall integrate a coarse Finite Element Mesh that represents the Space Station Node 1 module into two software packages and evaluate the relative merits of the two methods for predicting noise propagation in a station structure. The relative merits to be measured are the methods' relative accuracy and their relative performance characteristics such as their difficulty to integrate the mesh into the software and the time for implementation and operation. One method is the Statistical Energy Analysis (SEA) method. The commercial software is the AutoSEA2 module in the ESI Group's VA One software. The second method is the Energy Finite Element Method (EFEM). The commercial software for the EFEM methods is the EnFlow software module that is a part of Comet Technology's Comet Acoustic software.

The contractor shall test the software on a set of thirteen input points and seven output points that reside on the Node 1 module.

The contractor shall implement a hybrid method in conjunction with the commercial modeling tool EnFlow to analyze the International Space Station (ISS) Node 1 module acoustic datasets. The analyses involve decomposing the input excitation into direct and reverberant excitations, converting the measured direct input excitation into equivalent power, estimating the zone of influence of direct field, and superimposing the responses of local and reverberant fields to compute the composite field. The analysis will be performed on an additional five different datasets at known locations provided by NASA. The task deliverable will include data simulation results obtained from the hybrid method and a report describing its theory, methodology, and performance.

The contractor shall participate in weekly review meetings.

Performance Standards

The contractor performance shall be evaluated on

- Their ability to execute the task by providing demonstrable progress at weekly reviews.
- A report that quantitatively delineates the pros and cons of the two methods.
- Completion of the task on schedule.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

Node 1 structural data is considered ITAR and EAR sensitive.

4.0 Schedule/Milestones/Period of Performance

Period of performance is November 1, 2008 through October 31, 2009

5.0 Deliverables/Reporting Requirements

The contractor shall provide the results showing the relative accuracies of the inputs vs. outputs and an evaluation report on the 1) difficulties of integrating the FEM mesh with the methods and 2) their relative time for implementation and operation. The report shall contain a calculation of the time it would take for each method to calculate a table representing all the mesh points as noise sources. The contractor shall also provide any files that were generated as a part of the FEM mesh integration into the software modules.

6.0 Other information needed for performance of task

Both software modules are owned by NASA Langley Research Center and reside on LaRC computers. Access on site will be required.

In addition, the work will have to be coordinated with others who are also trying the software out.

The Node 1 mesh will be provided by The Boeing Corp.

_____ will provide actual test data from the Node 1 STA module.

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-035_mod0 CY 3

Task Order Title: CLARREO - Software Engineering Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

For the CLARREO Pre-Phase A Study -

The contractor shall:

1. Participate in the CLARREO Pre-Phase A Study, development of preliminary mission requirements definition, top-level trade studies, ROM costs and schedules, and feasibility assessment as the software engineering discipline expert. Provide software architecture and engineering expertise for all aspects of the mission software including instrument flight software, ground support equipment software, and mission operations software. Participate in weekly CLARREO Pre-Phase A Study team meetings and telecons, Interactive Design Center (IDC) sessions, workshops with Partners, and project reviews (Red Team Review, LaRC Commitment Review, and Mission Concept Review). Develop and provide sections of the documentation including the Pre-Phase A Study Report, the Preliminary Mission Requirements Document, and the ROM Cost Estimate.

Occasional travel shall be required for meetings and workshops with Partners. Expect up to three trips a year each for about three days to the East coast area.

Performance Standards:

- a. Top-level trade studies, preliminary mission requirements documentation, and ROM costs and schedules are delivered within agreed to times that align with the CLARREO Pre-Phase A schedule.
- b. Trip reports, IDC session products, and project review notes and recommendations are due within ten working days after the trip, IDC session, or project review.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is 11/01/2008 through 10/31/2009.

Project specific, determined prior to task, and agreed upon by technical monitor and COTR.

Milestones:

Internal IDC Session Dry Run	11/2008
Initial IDC Session	12/2008
Final IDC Session w/ Partners	1/2009
Initial Cost Estimate Completed	3/2009
Initial Documentation Drafts Completed	4/2009
Final Documentation Drafts Completed	5/2009
Red Team Review	7/2009
Instrument Models and Designs Completed	8/2009
All Documents Finalized	8/2009
LaRC Commitment Review	8/2009
Mission Concept Review	9/2009

These dates are based on the project's schedule so these dates could change as the project's milestones change.

5.0 Deliverables/Reporting Requirements

Contractor shall represent the Flight Software Systems Branch (FSSB) in providing Software Support to the Project, as such; the contractor shall perform assigned workload in accordance with FSSB Software Policy. Contractor shall coordinate project software status with the Flight Software Systems Branch during FSSB monthly project reviews, and possibly more often as dictated by important events. Monthly status reports shall be sent electronically to the Branch and TM prior to each FSSB monthly project review.

Plans, schedules, trade studies, reports, designs and other data artifacts listed in section 2.0 of this task agreement shall be delivered electronically to the TM within ten days after completion of the data

6.0 Other information needed for performance of task

This task will require access to Sensitive or ITAR Data. (Note: Could not enter into section 3.0 above due to system error)

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-036_mod0 CY 3

Task Order Title: Orion - Software Engineering Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

For the Orion Software Engineering Support
The contractor shall:

1. Support the Orion Software Function Manager for Human Systems (Environmental Control and Life Support System – ECLSS) in preparing for the Orion Preliminary Design Review and supporting technical reviews, peer reviews and review boards. This support includes, but is not limited to, the review of Orion Prime/Subcontractor developed trade studies, domain diagrams, use cases, functional requirements, sequence diagrams, interface requirements, test plans, design documentation, and UML models.

2. Support the Orion Software Function Manager in participating in interdisciplinary team meetings and product reviews.

3. The contractor shall become an expert in the use of UML and Telelogic Rhapsody (and other tools provided) to support the effective review of Orion Prime/Subcontractor developed products.

Occasional travel shall be required to support meetings with Orion team members. Expect approximately four trips a year each for about three days to various CONUS locations.

Trip reports and review notes/recommendations are due within five working days after each trip or project review.

Performance Standards:

Proactive execution of assignments with a specific focus on meeting mission objectives through team work.

Additional emphasis will be placed on the early elimination of problems during technical reviews, rather than letting them slip undetected to major milestone reviews.

3.0 Special Requirements

Access to Sensitive or ITAR Data: Yes

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is November 1, 2008 through October 31, 2009

Tentative Project Milestones:

System Baseline Review

October 2008

Preliminary Design Review

August 2009

These tentative dates are based on the project Orion schedule; therefore these dates could change as project plans are modified.

5.0 Deliverables/Reporting Requirements

Contractor shall represent the Flight Software Systems Branch (FSSB) in providing Software Support to the Project, as such; the contractor shall perform assigned workload in accordance with FSSB Software Policy. Contractor shall coordinate project software status with the Orion Project Lead during weekly status meetings, and possibly more often as dictated by important events. Monthly status reports shall be sent electronically to the TM.

Plans, schedules, trade studies, reports, designs and other data artifacts listed in section 2.0 of this task agreement shall be delivered electronically to the TM within five days after completion of the task.

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-037_mod1 CY 3

Task Order Title: CLARREO - Engineering Support

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

For the CLARREO Pre-Phase A Study -

The contractor shall:

1. Assist in the development of an Instrument Model for the Infra-red Instruments that CLARREO will be developing. Specific Tasks will be to evaluate the proposed design and assist in the development of the full instrument model which will include responsivity, and all possible noise sources. Once model is developed and test instrument will be built, parts will need to be specified and manufactures will need to be identified. Once parts are received, the test instrument will need to be assembled and tested. Assist in the development of calibration concepts for the instrument.
2. Assist in the CLARREO System Engineering Task. Specific responsibilities include development of the mission level requirements document, recording the technology readiness levels of any new technologies and general support of the system engineering functions.
3. Support of the Project Management in helping to develop, staffing profiles and long range schedules, as well as assist in the development of internal review requirements.
4. Refinement of CLARREO Level 1, Mission, & Measurement Requirements; Refinement of the Technology Assessment and Development Plan; Support MCR Preparation and Concept Review

Deliverables including travel and consulting:

May 29th: Science Team refinement of the Level 1, Mission, and Measurement Requirements
June: Technology Assessment and Development Plan Draft
July 17th: Peer Review refinement of the Level 1, Mission, and Measurement Requirements
August: Technology Assessment and Development Plan Refinement
December 15: MCR Summary

Travel

April - travel to JPL for the GPS Workshop
Early May - Science Team Meeting at LaRC
Late June - Peer Review Meeting at LaRC
End August - MCR Package Preparation at LaRC
October - MCR at LaRC
December - Action items from MCR wrap up at LaRC

Occasional travel shall be required for meetings and workshops with Partners. Expect up to three trips a year each for about three days to the East coast area.

Performance Standards:

- a. Top-level trade studies, preliminary mission requirements documentation, and ROM costs and schedules are

delivered within agreed to times that align with the CLARREO Pre-Phase A schedule.
b. Trip reports, IDC session products, and project review notes and recommendations are due within ten working days after the trip, IDC session, or project review.

3.0 Special Requirements

Access to Sensitive or ITAR Data: Yes

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is award through 10/31/2009.

The schedule and milestones shall be provided to the Contractor by the NASA Technical Monitor as required.

5.0 Deliverables/Reporting Requirements

Monthly status reports shall be sent electronically to the Project Manager (PM) and the TM at the beginning of each month.

Plans, schedules, trade studies, reports, designs and other data artifacts listed in section 2.0 of this task agreement shall be delivered electronically to the PM and TM by schedule agreed upon by the TM and the Contractor

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-038_mod0 CY 3

Task Order Title: FPGA Development Engineering

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

For the Orion Relative Navigation DTO project -

The contractor shall:

Provide the FPGA design for the avionics data recorder system. Perform the design, simulation, development, integration, verification, and testing to meet Space Shuttle environmental requirements. The design shall include high speed data interfaces, data routing, Space Shuttle interfaces, networking interfaces, command decoding, power control logic, memory storage interfaces, time stamping, and health and status processing. Provide full documentation of the design including simulation, test results, and theory.

Deliver the design in three stages. First stage in a prototype, second stage in a engineering model, and third stage in the flight model.

Provide cost, schedule, and resource estimates.

Provide environmental qualification test plans and procedures.

Write test reports no later than 14 days after test has been performed.

Participate in weekly team meetings and telecons, project technical interchange meeting (TIMs), design reviews, instrument contractor review and telecons. Occasional travel shall be required to fulfill these objectives for project reviews and technical interchanges.

Performance Standards:

Trade studies, analyses, requirements documentation, design documentation, and test procedures are delivered within agreed to times that align with the project schedules.

3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is award through 10/31/2009.

Schedule:

Complete the FPGA requirements for the Avionics SRR in Feb. '09.

Present the FPGA design at PTR-2 in Apr., '09.

Complete the FPGA prototype version by Jun., '09.

Complete the FPGA engineering model by Oct., '09.

Present the FPGA design at PTR-3 in Oct., '09.

For future reference:

Complete the FPGA flight version by Jan. '10.

These dates are based on the project's schedule so these dates could change as the project's milestones change.

5.0 Deliverables/Reporting Requirements

Reports, test plans and procedures, schedules, system-level and subsystem designs, and trade studies shall be delivered electronically to the TM within ten days after completion of the task.

Monthly status reports to be sent electronically to the TM.

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-039_mod0 CY 3

Task Order Title: Signal Processing for Lidar Ranging Systems

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

OVERVIEW

The Autonomous Landing and Hazard Avoidance Technology (ALHAT) Project has been established to provide an autonomous lunar landing system for crewed, cargo, and robotic lunar descent vehicles. The ALHAT system will enable global lunar access for exploration of areas on the lunar surface never before visited, without regard to lighting conditions. The ALHAT system will be capable of landing a lunar descent vehicle within required precision and accuracy of a pre-descent designated landing location. This integrated system includes dedicated landing sensors, computational algorithms, and an interface to a landing vehicle command and data handling system that ultimately will be in control of the landing vehicle. The scope of the ALHAT Project includes the definition, design, development, test, verification, and validation (V&V) of an integrated Guidance, Navigation and Control (GNC) lunar descent and landing system consistent with Technology Readiness Level (TRL) 6.

To meet the safe and precise landing requirements, the ALHAT system will make use of the 3-D imaging sensor data to detect and avoid potential landing hazards during the final stages of the powered descent for lunar landing. The ALHAT system landing sensor and associated algorithms will be capable of detecting and locating landing hazards such as rocks, craters, slopes or other discontinuous surface features. This ability to detect and locate hazards will enable the potential for trajectory retargeting and maneuvering to a safe landing site. The simultaneous acquisition and location determination of hazards and conversely, acquisition and location determination of safe landing sites, along with the relative position information inherent in the 3-D image, will enable the precision navigation necessary both to avoid hazards and land precisely at the retargeted location.

The basic technology chosen for this sensor is flash Light Detection and Ranging (LIDAR). Flash LIDAR provides a 3-D imaging capability which can be exploited to generate the necessary information for accurate navigation by implementation of appropriate real time signal and/or image processing techniques. The goal is to advance the core sensor component technologies to a technology readiness level that enables their eventual infusion into future space flight missions.

DESCRIPTION OF EFFORT

The contractor shall provide the technical staff and work processes to accomplish the requirements specified in the Task Order. Responsiveness will be an important metric for task performance. The contractor shall keep the government informed of all activities, such as work successes, problems, and potential problems, as soon as they are known. The contractor shall respond rapidly and effectively to the customer's dynamic, unanticipated, and emergency work requirements by restructuring priorities. The

format of technical progress reports (see 5.0, Deliverables) will be established with the TM to provide maximum value and communication.

These reports will be used to confirm priorities and current schedule constraints continually, and to communicate the work areas of the WBS planned for the coming month. Metrics for delivery schedules will be established and evolved through the planning mechanism of the technical progress reports.

All work specified by the Task Order will be performed under the following structure.

2.1 WORK BREAKDOWN STRUCTURE

All work for this task will be performed under a single WBS number.

2.2 QUALITY AND PERFORMANCE STANDARDS

The contractor shall follow its rigorous ISO, safety, and IT security standards. General quality standards are presented in the STARSS Quality Plan. Specific task quality requirements are established with the TM on a continual basis during the performance of the task.

Performance is monitored through periodic reviews with the TM and through formal semiannual surveys. The Contractor shall supply a status report to the TM monthly.

The following specific performance standards will be met:

The contractor shall continue development of a prototype for 3-D Image Pre-processing Enhancement (3D-IPE) of data from a flash LIDAR focal plane array camera system to improve image spatial resolution and photometric accuracy - with special attention to multi-frame super-resolution techniques. The contractor shall advance the development of the current 3D-IPE (3-D Image Pre-processing Enhancement) prototype system toward the next readiness level, with the generation of rectified resolution-enhanced 3-D images - targeting 30 fps in an embedded environment. To that end, the contractor shall perform the following tasks:

4.1 Complete the effort to embed the single-frame (Simulink-only) enhancement model on the Fixed-Point DM642 DSP using the Real-Time Workshop.

4.2 Further develop the Simulink simulation model representing the entire image processing pipeline, including select multi-frame super-resolution techniques, in-lining or converting all M-Files to C-MEX or Simulink-only (built-in) blocks.

4.3 Integrate camera/vehicle position, pose and velocity information into the model to improve frame-to-frame motion estimates for multi-frame image registration and to perform 3-D projection (and orthorectification) onto a reference DEM.

4.4 Extend the multi-frame super-resolution method in the Simulink model (and generated embedded code) to more than 3 frames.

- 4.5 *Explore other reconstruction methods and develop an imaging model (PSF) specific to the LIDAR camera that can be used in certain reconstruction methods.*
- 4.6 *Explore alternate embedded solutions such as parallel DSPs or FPGAs.*
- 4.7 *Develop a set of heuristics to dynamically choose among alternative registration and reconstruction techniques based on a variety of factors.*
- 4.8 *Use target calibration images and MTF-like metrics to quantify differences in super-resolution and other spatial resolution enhancement techniques.*
- 4.9 *Generate embedded code for the Floating-Point C6713 DSP using the Real-Time Workshop, including select multi-frame super-resolution techniques.*
- 4.10 *Embed and test the generated code on the C6713 DSP using Real-Time Data Exchange (RTDX) over a JTAG interface in a Processor-in-the-Loop (PIL) fashion.*
- 4.11 *Demonstrate and validate the prototype system in NASA-Langley's or the contractor's laboratory.*
- 4.12 *Document and deliver the prototype*

3.0 Special Requirements

Access to Sensitive or ITAR Data: Null

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is Award through 10/31/2009

Schedules are as-agreed between the Contractor and the Task Monitor.

5.0 Deliverables/Reporting Requirements

1. Prototype system hardware and software, including DSP development platform and models developed in MATLAB/Simulink.
2. Final report, including user guide and developer reference

6.0 Other information needed for performance of task

The contractor shall assign the appropriate staff resources to perform the requirement identified in the Task Order. The metric for staffing will be indicated by success in staff retention, timely recruiting, and anticipating the required skill mix. Off-site support costs will be apportioned to the task to accommodate contract management, group lead management, and infrastructure administrative functions.

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-040_mod0 CY 3

Task Order Title: CLARREO Conceptual Operations and Spacecraft Development

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

Introduction/Background: The Climate Absolute Radiance and Refractivity Observatory (CLARREO) is a climate mission identified as a top priority by the National Research Council Earth Science Decadal Survey. In preparation of a mission launch in 2017 the project is required to develop a Mission Management Plan (MMP) to be reviewed by NASA Head Quarters Science Mission Directorate in September 2009. A subset of the MMP will be the Conceptual Operations Plan and the Assembly Integration and Test Plan of the science instruments to the spacecraft.

Scope of Work: This SOW covers the development of the Conceptual Operations Plan and the Assembly and Integration Test Plans for the spacecraft bus and the science instruments to the spacecraft bus. Additional specific requirements for these plans include process flow, required resources, costs, technical challenges and identified potential risks.

Applicable Documents/Background: This project was initiated and identified as a top priority by the National Research Council Earth Science Decadal. Additional documents include the NASA Procedural Requirements (NPR) 7123.1, Systems Engineering Processes and Requirements and NASA Scientific Publication (SP) - 2007- 6105 – Rev1, NASA Systems Engineering Handbook.

Description of Tasks/Technical Requirements: To prepare for Mission Readiness Review the Conceptual Operations (CONOPS) and Integration & Test Plans are required to be scoped and developed. The contractor shall perform the following tasks:

- 4.1 Develop preliminary Conceptual Operation Plan, high level schedule and costs estimate.
- 4.2 Develop preliminary Spacecraft Integration & Test Plan, high level schedule and costs estimate
- 4.3 Develop preliminary Spacecraft to Science Instrument(s) Integration & Test Plan, high level schedule and cost estimate.

Project Status Meetings – Weekly – Duration 1 hours – Location LaRC

Interim Project Reviews – As required (monthly) – Duration 2-3 days – Location LaRC

3.0 Special Requirements

Access to Sensitive or ITAR Data: Null

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is Award through 10/31/2009

5.0 Deliverables/Reporting Requirements

- 1) Outline of Conceptual Operations Plan – 6 Weeks after award
- 2) Integrated preliminary high level process flow of spacecraft I&T – 12 Weeks after award
- 3) Integrated preliminary high level process flow of spacecraft to science instrument(s) I&T – 12 weeks after award

Interim progress reports-The contractor shall provide monthly report of activities, status and issues. These reports may be in the form a PowerPoint slide presentation.

The contractor shall keep the Technical Monitor informed of status and progress by regular correspondence or meetings. Changes to the completion date must be approved by the Contracting Officer.

6.0 Other information needed for performance of task

N/A

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-041_mod0 CY 3

Task Order Title: SAGE & CLARREO Electronic Parts and Component Engineering

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide support for the SAGE & CLARREO Instrument project's Electrical, Electronic, and Electro-mechanical (EEE) parts review effort. This should include efforts for providing technical support for existing parts in the SAGE & new design CLARREO payload as well as possible new EEE activities including selection of new hi-reliability parts for any additional instrument modifications or new designs. Support shall include researching EEE parts and providing recommendations (oral & written) on their use for the intended environment and providing analysis on parts application in designs to mitigate risk associated with the use of those EEE parts. The contractor shall make parts recommendations based on component technical performance, schedule criticality and cost trade-offs. Analysis tasks shall include Government-Industry Data Exchange Program (GIDEP) search alerts and recommendations as well as other environmental and quality component issues. Component radiation performance shall be reviewed for parts suitability in the various instrument electronics assembly applications. Routine work product and deliverable task items shall be in MS Office format. Support shall include office meetings - routine , technical interchanges, parts control board and program reviews. When necessary, parts analysis , review and design application shall include communication with the SAGE & CLARREO prime instrument support contractor(s) for the necessity to aid the selection or substitution of necessary EEE parts for project usage. The aforementioned support level shall be extended to cover recommendations to the LaRC Office of Safety & Mission Assurance (SMA) as well as other Langley center activities which also support the SAGE & CLARREO project program. The contractor shall be able to provide EEE Parts support knowledge unique to the understanding of the longevity of the SAGE & CLARREO instrument and the risks associated with utilizing the components contained in the SAGE & CLARREO flight hardware. This support should enable the identification of critical items, their prioritization and timely review for risk assessment purposes.

Additional performance criteria:

- Reporting of accomplishments to be made monthly to the Technical Monitor (TM), within 5 business days of completion of the reported period
- Parts are researched, analyzed, reviewed and possibly selected with recommendations provided as agreed upon with the TM
- Designs are analyzed and recommendations provided to support EEE parts issues as required
- Documentation provided to support parts analysis and recommendations on risk assessment

- Ability to multi-task and provide variable support for Tiger Teams and part failure analyses for such projects such as CALIPSO, IRVE II, MEDLI, Ares I-X and NEPP related activities.
- Provide continuing support for Center AS9100 EEE Parts process refinement and implementation related activities. Task items may include updating approved parts/vendors/distribution lists and coordination with the LaRC Office of Safety & Mission Assurance (SMA).

3.0 Special Requirements

Access to Sensitive or ITAR Data: Yes

Other (Specify):

- Field activities (support may be required by administering LaRC efforts at Instrument Subcontractor Worksite (, i.e. program meetings or reviews, technical interchanges)
- Meeting/conference support for programs as required, typically 3 trips total required.

4.0 Schedule/Milestones/Period of Performance

Monthly report of accomplishments submitted electronically to TM starting May 31, 2009.

Schedules for specific activities will be agreed upon between the contractor and the TM in formal weekly meetings typically held on Tuesday morning of each week.

Period of Performance is Award through October 31, 2009.

5.0 Deliverables/Reporting Requirements

Parts Plans, Work Break down analysis, Reports, Parts Lists, Component and Circuit Analysis shall be submitted as agreed upon with the TM. Meeting/teleconferences shall be conducted in support of EEE parts activities as required.

6.0 Other information needed for performance of task

Parts list information will be provided by the Instrument subcontractor and NASA Langley Research Center

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-042_mod0 CY 3

Task Order Title: Relative Navigation for ORION DTO QA Support for Assembly, Test & Polymer Inspection of Space Flight H/W

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide Quality Assurance support for the assembly and testing of the Avionics System and PGSC at LaRC and the integration and test of the Avionics and PGSC with the Sensor Suite developed by BATC at BATC:

- Support the assembly and testing of flight hardware. This shall include the following:
 - Verify that the equipment (torque screw drivers, power supplies, meter, etc) are in calibration.
 - Observes the step-by-step assembly and testing of the hardware to verify that it has been done according to procedure.
 - Observes the application of polymers and verifies that the process has been done according to manufacturers specifications
 - Monitors that the assembly of the hardware is done in a safe manner so that neither those working on the hardware nor the hardware will be at risk of accident.
- Verify that the procedures and photos for the assembly of the Avionics System are included in the flight logbooks, issue Non-Conformance Failure Reports (NFR) as required and close out NFR's once they have been dispositioned. This shall include the following:
 - Keep a log sheet that describes daily activities.
 - Generate Non-conformance Failure Reports (NFR) when components or assemblies do not match drawings or procedures.
 - Close out NFR in a timely fashion so the assembly of hardware could proceed forward.
 - Tracks the mate and de-mate of flight connectors.
- Provide oversight of the Flight bonded stores. This shall include the following:
 - Quality assurance will verify that components both electrical and mechanical are logged into and out of bonded stores.
 - Verify that all the components are flight component and that there is documentation for traceability.
 - Verify that the polymers are flight products and have not exceeded the expiration date.
 - Assist in the verification of flight mechanical hardware (screws, bolts, washers, helicoils, etc.
 - Perform random checks of the bonded stores to verify that they are properly maintained.
- Support the Acceptance Tests at Ball Aerospace in Denver, Colorado (approximately 5 weeks).

This shall include the following:

- Verify that the test equipment is within calibration.
 - Verify that the proper people are participating in the test.
 - Verify that the test set-up is properly configured.
 - Observe the test and verify that the test is being run according to procedure.
 - Document changes in testing by red-lining documents.
 - Document failures.
 - Stop tests that are being conducted in an unsafe manner.
- Support the Acceptance Tests at KSC (approximately 2 weeks). This shall include the following:
 - Verify that the test equipment is within calibration.
 - Verify that the proper people are participating in the test.
 - Verify that the test set-up is properly configured.
 - Observe the test and verify that the test is being run according to procedure.
 - Document changes in testing by red-lining documents.
 - Document failures.
 - Stop tests that are being conducted in an unsafe manner.
- Review test procedures.
- Polymer certification needs to be current through the task period.
- Support technical meetings and NASA review meetings. Most meetings can be supported by telecon; however, a total of 1 trip to KSC will be required for site preparation
- Work with the Mission Assurance Branch (MAB) to ensure required quality assurance policies/procedures are implemented and completed. In addition to the technical NASA Task Monitor, report quality activities/status/issues to the assigned MAB Point-of-Contacts (POCs):
Name:
Mail Stop:
Phone:
E-mail:
- Report activities and provide status weekly to _____ via email
- Coordinate work schedules and coverage with _____.

3.0 Special Requirements

Access to Sensitive or ITAR Data: Null

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of performance is award through 10/31/2009.

5.0 Deliverables/Reporting Requirements

- Finalize all build book documentation and close out all NFR's.
- Final review of bonded stores.

6.0 Other information needed for performance of task

Will require NASA training to access facilities at KSC.

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-043_mod0 CY 3

Task Order Title: VHDL Development and Test Engineer for the Relative Navigation for ORION DTO

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall provide VHDL development, debugging, testing and documentation to support the Avionics for the Relative Navigation for ORION DTO

- Troubleshoot the DDR2 to PLB Bus The Xilinx module on the ML410 needs to be debugged to verify its operation. The module needs to be reconfigured for the DDR2 memory implemented on the M6000.
- Develop, test, implement and document the Memory Board Interface between the Xilinx V4 FPGA on the M6000 and the Actel FPGA on the memory board.
- Port of Modules to M6000, which includes verification and testing to confirm the successful porting of the modules.
- Support the development and implementation of the UART interface
- Prepare test procedures and test reports
- Support weekly team meeting and provide status on previous weeks activities

3.0 Special Requirements

Access to Sensitive or ITAR Data: Yes

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance is Award through 10/31/2009

5.0 Deliverables/Reporting Requirements

- Weekly status reports delivered during team meetings in format agreed to between contractor and NASA TM.
- Test procedures and test reports in format agreed to between contractor and NASA TM.

6.0 Other information needed for performance of task

Will require NASA training to access facilities at KSC.

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee

Task Order Number: 3-044_mod0 CY 3

Task Order Title: CLARREO Instrument Modeling & Development

1.0 NASA Technical Monitor (TM):

2.0 Description of Work to be Performed and Performance Standards

The contractor shall support instrument modeling and development in support of the CLimate Absolute Radiance and REfractivity Observatory (CLARREO) mission. The contractor shall support the CLARREO mission instrument modeling and development by providing radiometric modeling, optical design, polarization-sensitivity analysis, stray-light analysis, and optical support for the Structural Thermal Optical Parametric (STOP) analysis. The contractor shall support science and instrument teams, and participate in mission and instrument design workshops and trade studies.

The support shall involve electro-optical instrument design to develop, deploy, and improve remote sensing instrumentation for Earth-science measurements from space. The contractor shall apply expertise in radiometry, optics, and physics to assist in the modeling, design, and analysis of electro-optical instrumentation to meet the desired measurement requirements. The CLARREO instrumentation is expected to include infrared radiometers, Fourier transform infrared spectrometers, grating spectrometers, global positioning systems to measure atmospheric refractivity, and possibly laser/lidar systems.

Performance standards:

- Quarterly report of accomplishments is made within 30 days of completion of the reported quarter.
- Technical evaluations are delivered as agreed upon by the contractor and the Task Monitor (TM).
- Technical results produced by the contractor that are selected by the TM for distribution or presentations are clear, concise, and technically correct.

3.0 Special Requirements

Access to Sensitive or ITAR Data: Null

Other (Specify):

N/A

4.0 Schedule/Milestones/Period of Performance

Period of Performance: Date of award through October 31, 2009.

The Contractor shall meet with the Task Monitor during the first week of each month to set schedules and priorities for CLARREO instrument modeling and design for that month. Priorities depend on instrument performance and analysis of previous results and cannot be determined in advance. The contractor shall discuss modeling, design, and analysis results with the TM and other technical personnel within 1 week after results are obtained, and prepare the results for presentation and/or distribution as appropriate on schedules agreed to by the contractor and TM.

5.0 Deliverables/Reporting Requirements

Quarterly report of accomplishments delivered in electronic format to the TM by the end of the following month.

6.0 Other information needed for performance of task

The Contractor shall support meetings as required. For planning purposes, assume quarterly week-long trips to Washington D.C.

The following section shall be filled in by the Contractor

7.0 Data Rights

8.0 Safety

9.0 Risk

10.0 Proposed Award Fee